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American Machinist

A Practical Journal of Machine Construction

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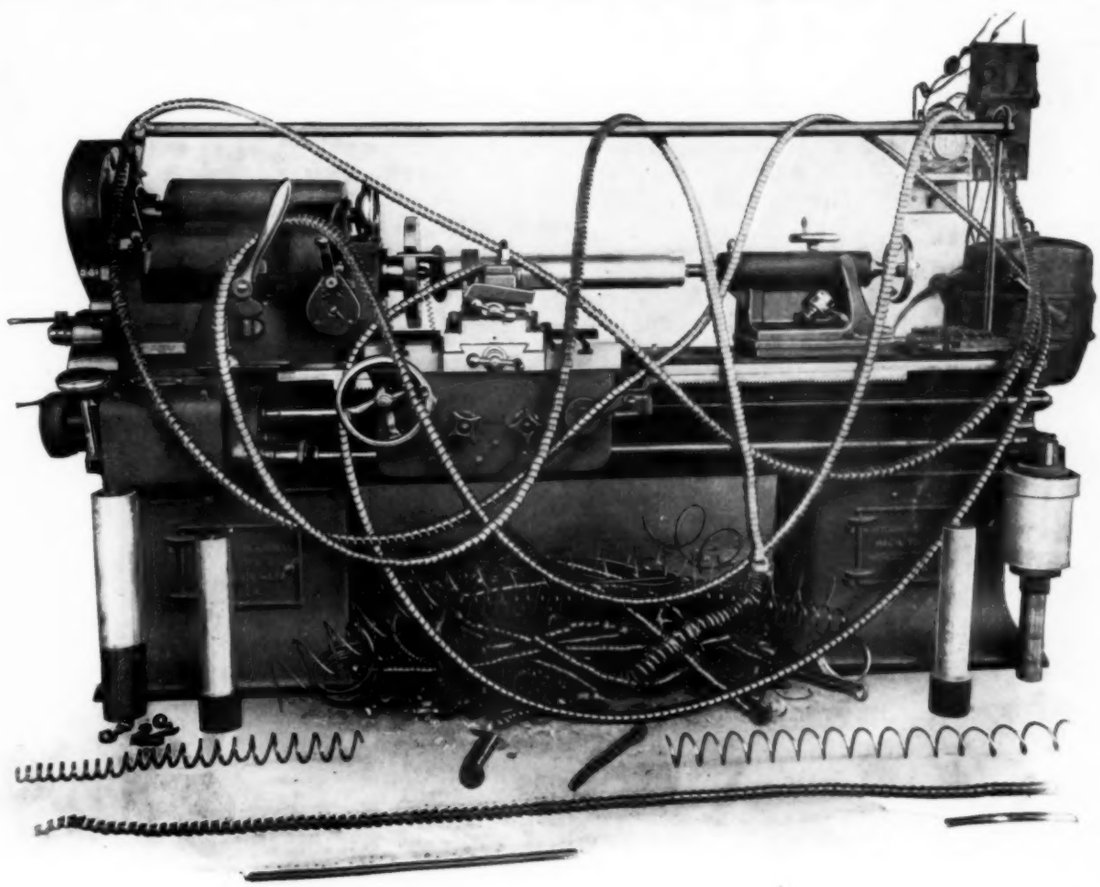


The O. K. Tool Holder Co., of Shelton, Conn., U. S. A., have fitted up a special testing outfit at their works as shown in the above cut, using one of our 18″x8′ Single Pulley Drive Lathes, with which to demonstrate the cutting strength of their tools, and are now thoroughly prepared to test out any and all of the new steels as they are put on the market, and to show the comparative merits of the O. K. Tools as against the solid forged tools or other tool holders.

The steel used in the O. K. Tools is made for them in Sheffield, England. The following are a few tests made with their size C Tools, in a $\frac{3}{8}$″x$1\frac{1}{4}$″ holder. As high as 25 H.P. of energy in a single point cutter has been used on some of the tests.

Power consumed by the lathe running idle is about $\frac{1}{4}$ H.P.

Subject.	Metal.	Length of Cut.	Time, Minutes.	Speed per Minute.	Feed per Minute.	Reduction.	Stock Removed.	
							Per Operation.	Per Minute.
65′ long chip from piece in lathe..	Oil Treated Steel $3\frac{1}{2}$% nickel, 0.40 carbon	20″	13	75′	40	1″	34	2.6
Piece at the right.....	Cast Iron	8″	1	165′	10	$\frac{3}{16}$″	10	10
Piece next to above.....	Machinery Steel	15″	3	175′	36	$\frac{1}{4}$″	16	$5\frac{1}{4}$
Fourth piece.....	Machinery Steel	15″	1	385′	36	$\frac{1}{16}$″	..	....

These tests were all verified accurately by a wattmeter which shows the exact power consumed at all times, a cut meter to show the speed of the cut and scales to show weight of material removed.

This lathe was not built special for these tests, but was sold the O. K. Tool Holder Co. from our regular stock.

Whitcomb-Blaisdell Machine Tool Co.

134 Gold Street **Worcester, Mass., U. S. A.**

Very Compact Head Stock for Belt or Motor Drive

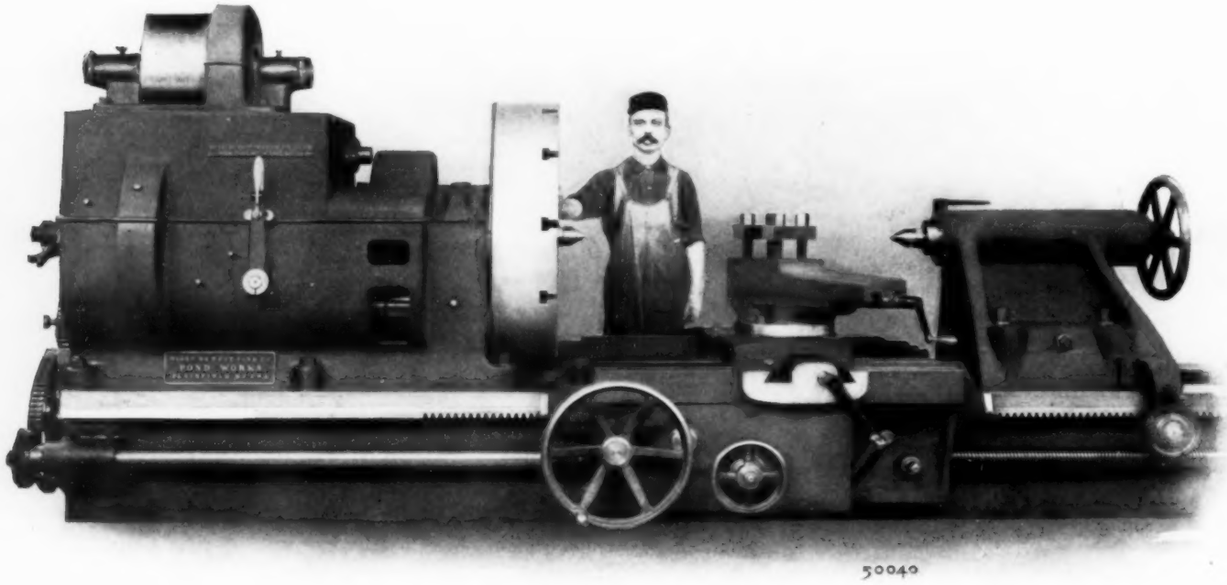
Head Stock on Pond Lathes is triple geared, has positive clutches that are readily engaged and disengaged and wide-faced all steel gears of large pitches and diameters. All gearing is accurately calculated for each individual design and is mechanically correct. No stock hand-downs used from other machines.

Pond Lathes

Readily Changed from Belt to Motor Drive at any time

The single pulley drive is readily converted to a direct motor drive by substituting a motor in place of the pulley, shaft and shaft bearings. The direct motor drive gives a wide range of spindle speeds as the motor has a speed variation of 2½ to 1 and on some sizes 4 to 1. The motor is controlled entirely from the carriage. Independent motor for carriage traverse. The countershaft for the single pulley drive is very simple, has no frictions and gives 12 spindle speeds to the geared head.

Mention the sizes used in your shop and receive illustrated and descriptive literature.



48-in. Pond Engine Lathe. 49-in. swing over bed; 39-in. swing over carriage.

Niles-Bement-Pond Company

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(*See pages* 43, 44, 45 *and* 46)

An Automatic Grinding Machine

Special Correspondence

The grinding machine has brought many surprises to the manufacturing world during the past decade. The latest development along this line is by the Norton Grinding Company, Worcester, Mass., in the shape of a machine which handles work automatically in the same way as the screw machine with its magazine feed. In practice there will be chutes leading to each magazine so that one man or boy can keep a battery of machines.

Figs. 1 and 2 show the front and rear views of a new automatic grinding machine recently built by the Norton Grinding Company, Worcester, Mass., for grinding cylindrical work up to 6 inches in diameter. The machine shown is fitted for grinding the outside of ball races, three of the rings being shown in the magazine feed, ready to roll down and be gripped in the chuck as soon as the retaining plunger is withdrawn at the proper time. The ring, which is dropped out of the chuck, falls on the small chain belt conveyer and is carried in a box placed at the end of the machine.

The heavy grinding head is very similar to that used on the regular Norton machine, but its movement to and from the work is controlled automatically by a cam on the shaft *O*, at the rear, in such a way as to secure absolute certainty of movement at each stroke, as will be seen from the detail engraving in Fig. 5. The grinding wheel is independently driven to secure the correct speed for the wheel, all other movements being timed by gearing from the pulley at the back through the medium of a positive clutch and other reason. Shaft *E*, which is connected by universal joints, rotates the disk *G*, which controls the chucking mechanism for holding the work while being ground.

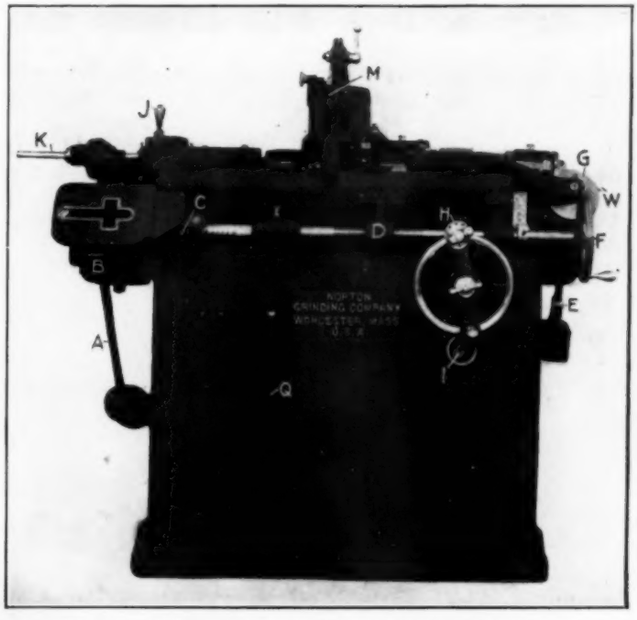


FIG. 1. A 6-INCH AUTOMATIC GRINDING MACHINE

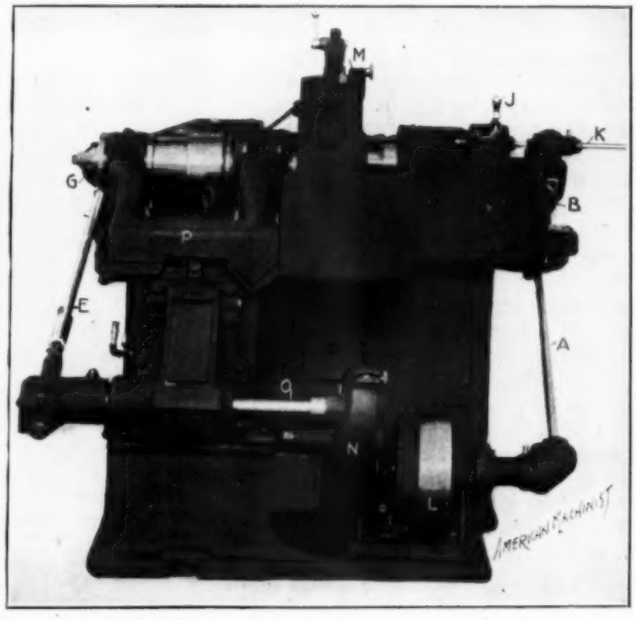


FIG. 2. REAR VIEW OF AUTOMATIC GRINDING MACHINE

planetary gearing. This clutch is controlled by the long lever at the front of the machine.

Both the rotation and traverse of the work across the face of the grinding wheel are actuated by shaft *A*, through the bevel gearing shown. The cam which moves the wheel to and from the work is driven by the shaft *O*, through change gears inclosed in case *N*. A shearing pin set in hardened steel plates protects the mechanism from injury in case a blank is fed in wrong way, or for any

THE CARRIAGE MOVEMENT

The movement of the carriage and the work past the grinding wheel is controlled by shaft *A*, driving the slotted disk *B*, in which the connecting rod *C* is located, to give any desired traverse. Shaft *A* also drives the splined shaft *K* by bevel gearing. This revolves the work-holding spindle through a small gear box *J*. This connecting rod drives the threaded bar shown in front of the machine in Fig. 1, and connects with the work carriage through the nut *D*. This nut allows the carriage to be positioned with reference to the grinding wheel, and is also used moving the carriage by hand in truing the grinding wheel. By placing a diamond in a suitable place provided in one of the chucking heads, and moving it past the wheel by means of a hand wheel *F*, the wheel is easily trued up.

INSURING CORRECT POSITION OF CARRIAGE

In this connection it is interesting to note the ingenious method of insuring the return of the carriage to its correct position after the wheel has been trued, so that the proper relation between the work to be ground and the face of the grinding wheel, may be preserved.

Two holes are drilled in the face of the crank disk *B*, so that one will come each side of the connecting rod when it is in the position shown. These holes come directly under the short arm of the cross-shaped opening in the cover plate over this disk. A special locating fork is made with a dowel pin in each fork, which fits into the holes in the disk *B*, and as this fork straddles the connecting rod, it locks it in position. Before truing the wheels this fork is inserted through the cross opening, locking the connecting rods, and the diamond is then passed in front of the grinding wheel by moving the whole carriage.

As the guard with the cross-shaped opening is connected to the carriage, it moves with it, the long slot allowing room for the handle of the locating fork. It is, however, impossible to withdraw the fork and release the connecting rod until the carriage has been returned to its original position, so that the fork can

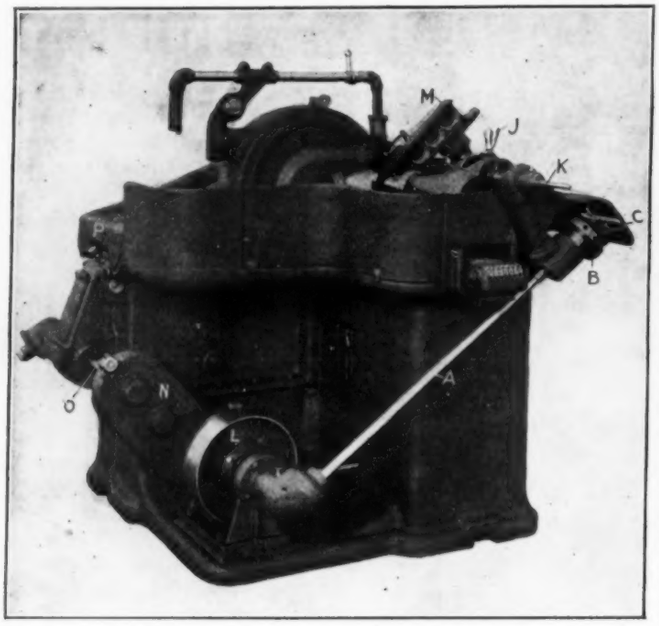


FIG. 3. SIDE VIEW, SHOWING MAGAZINE DELIVERY OF WORK

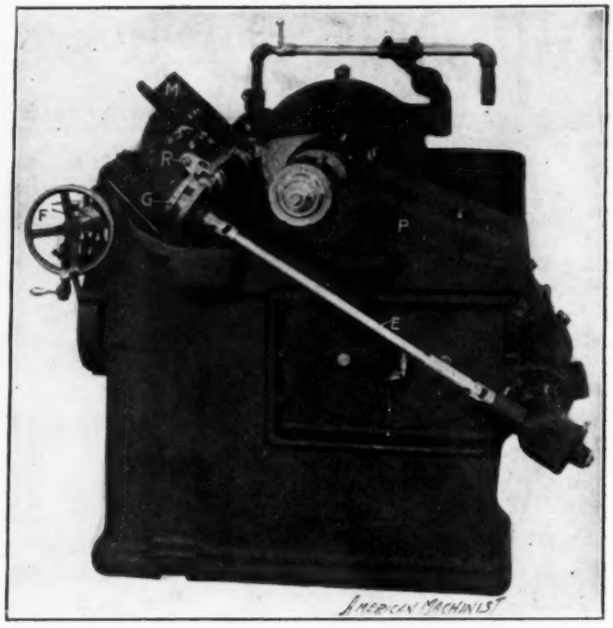


FIG. 4. MECHANISM CONTROLLING THE CHUCKING OPERATION

be readily withdrawn through the cross opening.

CONTROL OF THE WHEEL SLIDE

Fig. 5 shows a cross-section through the bed beneath the wheel slide. Connected to the bottom of the wheel slide is the massive nut *A*, having a modification of a buttress thread and provided with glands on each end, through which the rod *B* passes so as to prevent the oil working out from the reservoir inside the nut. A groove in the bottom of the nut allows the oil free passage from one end to the other. The end of the adjusting screw bears against the end of the rod *C*, this bearing surface being made as true as possible by grinding. Rod *C* is keyed to prevent turning.

The shaft *O* drives the cam *D*, but the cam is supported in its own bearings formed by long hubs on each side of the cam face. The cam turns in the direction shown by the arrow and bears against the lower end of the lever *E*, which in turn forces the rod *C* against the end of *B* and moves the whole wheel slide toward the work. The stop screw *F* is carefully adjusted so as to make contact with the lever *E* at its point of maximum travel. In this way the wheel slide is moved a predetermined distance, and as the lever *E* is brought against a positive stop, while still in contact with the highest point of the cam, the question of oil film either between *D* and *E* or in the bearings of the cam itself is entirely eliminated, as both of these points are in metallic contact at the instant the cam is in the position shown. This makes it possible to secure duplication of work to within 0.00025 inch in regular practice. The use of a large wheel having a broad face adds to its life, and wheel dressing is not nearly as frequent as might be imagined.

ADJUSTING FOR WEAR OF WHEEL

When it becomes necessary to adjust the wheel slide to make up for wheel wear, the reason for threading the rod *B* into such a substantial nut becomes apparent. As the wheel wears, it is necessary to screw the rod *B* into the nut just enough to compensate for the amount trued from the wheel. The end of *B* is flattened, as can be seen at *I*, and is carried by a pair of forged-steel clamps. These clamps are fastened to the gear wheel *X*, which is revolved by the pinion *Y* through the handle shown. This is for rapid adjustment in setting up for new work. For finer movement the handle *H*, which controls a small pinion meshing into the large wheel *Z*, reduces the movement so that moving *H* one hole, moves the wheel slide 0.00005 inch. This makes it possible to obtain any adjustment that may be needed with ease and certainty.

AUTOMATIC CHUCKING OF THE WORK

Fig. 4 shows the chuck-actuating mechanism, driven from the main shaft

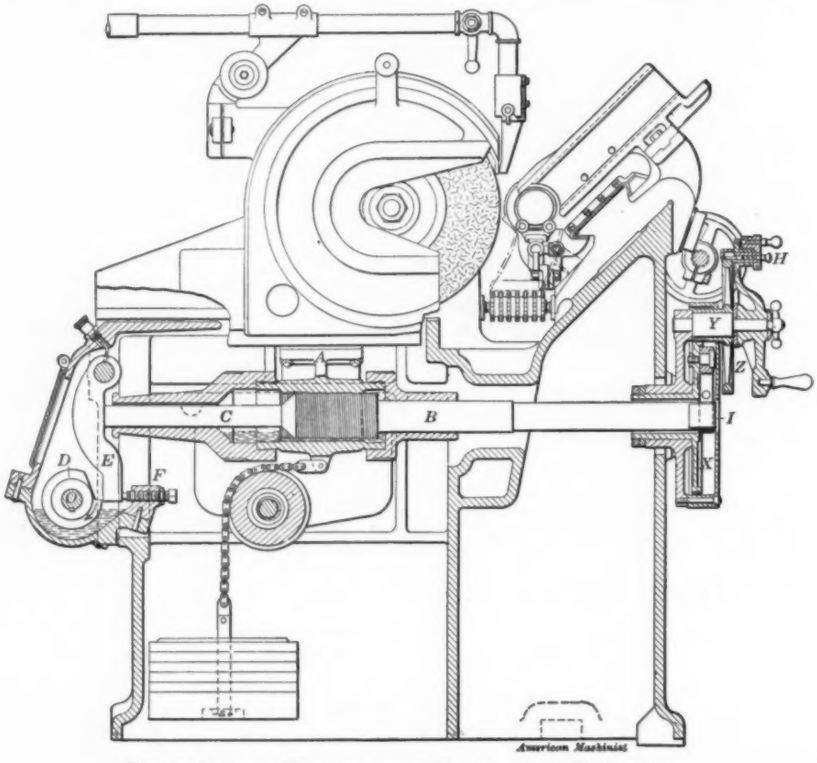


FIG. 5. SECTION THROUGH THE WHEEL-SLIDE MECHANISM

by the universal jointed rod *E*. The double disks *G* carry a hardened-steel roller between them, as can be seen, and also a releasing pin *W*, on the upper disk, which will be seen to project in Fig. 1. This is shown in detail in Fig. 6. The work is held by being gripped between two plungers, which centers and holds it while being ground.

The movable plunger is controlled by the roller in the plate *G*, acting on the cam lever *T*, which in turn acts on the plunger *U* through the hardened projection on the outer end. The plunger is returned by the spring shown in the sectional view, and after dropping a piece of work it remains open until the next piece drops into place. Then the roller comes in contact with the cam lever *T*, grips the work and, as soon as *T* reaches its gripping position, the latch *V* drops into

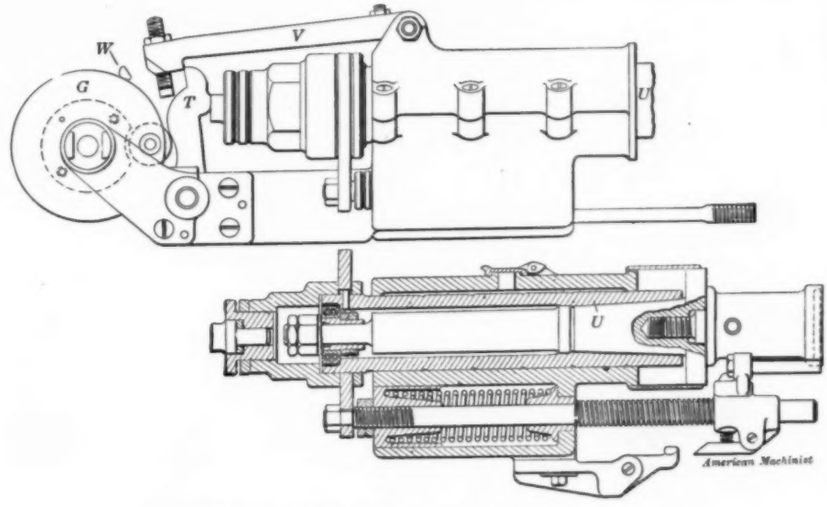


FIG. 6. CHUCK MECHANISM FOR HOLDING

place and holds it while the work is being ground. The work remains locked in position until the releasing pin *W* comes under the adjusting screw in the end of the latch *V*, which releases the lever *P* and allows the spring to force back the plunger *U* and release the work. It is then ready to receive the next piece, which rolls into place as soon as the releasing plunger is withdrawn by the opening of the chuck. It will be noticed that the piece which comes in contact with the work is screwed into the end of the plunger and can be readily changed to suit any class of work to be ground. It will also be noted that the work-holding plunger is free to revolve, being driven through the small four-speed gear box *J*, on the other end of the carriage.

This machine can also be easily arranged as a semi-automatic by a slight modification of the carriage so as to substitute centers for the automatic chucking device shown with this.

Steam Turbine Blades

By David Melville

The accompanying line cuts show a milling and lathe fixture used for machining 168 of the small steam-turbine buckets, Fig. 1, which were for a model. As this work was experimental it was important that the fixtures used be made plain as economically as possible from the materials at hand.

On account of the peculiar shape of these buckets and the delicate, sharp edge that is formed where the 0.015-inch flat meets the 0.094-inch radius, it was necessary to make the fixture so as to protect this edge. The buckets were made from cold-rolled machine steel, 3/16 by ¼ inch, which was cut in lengths equal to the length of the jaws of the miller vise, after which the V-shape was milled as close to the mill vise as possible; 1/32 inch of the metal being clamped in the miller vise.

The next operation was to cut these milled pieces to the proper length, after which they were clamped in the fixture, Fig. 2, and the 0.094-inch radius rough milled. In this operation the 1/32-inch stock, which was clamped in the miller vise, was nearly all milled off with the 0.094-inch radius cutter, allowance being made for a finish cut. The cutter was sharpened, for the finishing cut.

The fixture, Fig. 2, was made of machine steel; the V-groove *A* was made a perfect fit for the bucket, care being taken that the 0.015-inch flat was protected. The backs of the two pawls *B* are made at an angle of 3 degrees, and are held in place by the two drill-rod pins *C*, which are a light drive fit in the body of the fixture. The holes in the pawls are made 1/32 inch larger than the pins, which allows for the motion of the pawl when clamping the work in the fixture, because then the pawl pinches downward as the 3-degree face becomes perpendicular with the jaws of the fixture. The movable jaw *D* is guided by the two drill-rod pins *E*, and the work clamped by the thumb screw *F*.

The lathe fixture, Fig. 3, is made of gray iron. *H* is machine steel, accurately made to fit the buckets and is a drive fit in the casting. *I* is a 0.094-inch radius, hardened and ground steel plug, and is held in position by the piece of music wire *K*, which is soft soldered in plugs *I* and *L*. The hole in the fixture which contains *I* is bored 0.003 inch large to allow *I* to clamp the bucket with the screw *M*. This screw is made nearly to a point so as to insure central clamping of the buckets. A short steel plug, one end of which is hollowed to the same radius as *I*, is shown under *M*.

The plug *L* is a drive fit in the casting, and is threaded to fit the piece of 3/16-inch rod, which passes through the spindle of the lathe and is supported on the opposite end by the brass plug *P*, this being a light drive fit in the lathe spindle. A ⅛-inch hole is drilled in the threaded end of the 3/16-inch rod and is used as an adjustable stop.

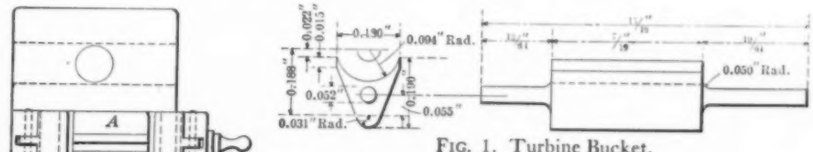
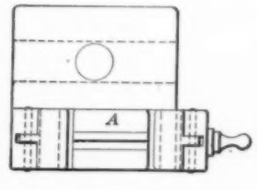


FIG. 1. Turbine Bucket.



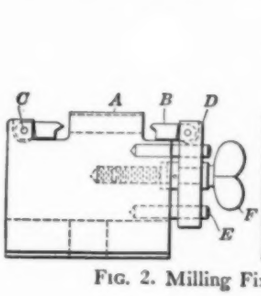


FIG. 2. Milling Fixture.

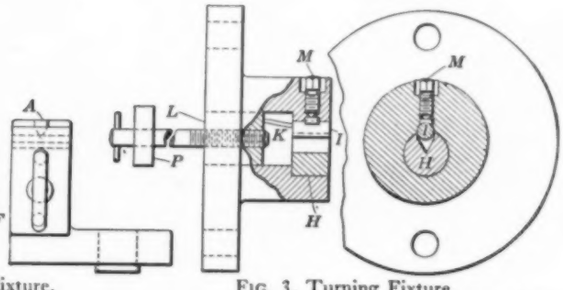


FIG. 3. Turning Fixture.

American Machinist

MAKING TURBINE BLADES

Illumination in Machine Shops

Special Correspondence

A system of lighting in use in a well known establishment that provides ample illumination without shadows, and with every part of the shop equally distinct. Four rows of Cooper-Hewitt lamps are located along the main and side bays, and so spaced as to flood the building interior with light. Character of the illumination revealed by a photograph taken at night on short exposure, with the aid of the regular lights alone.

Along with the effort that is being expended to minimize the possibilities of accidents in the machine shop by guarding gears, shafts and pulleys, belts, emery wheels, etc., it should not be overlooked that a frequent source of danger is found in inadequate lighting facilities, which may cause an otherwise practically safe establishment to be more or less dangerous to workmen and others, during such seasons of the year or such periods of activity as render necessary a resort to artificial illumination. With all our attempts to do away with shop accidents by covering up dangerous mechanism by keeping aisles clear, by establishing rules in regard to the handling of belts, the operation of elevators, and other things of this nature, it must not be forgotten that a dark shop or a shop brilliantly lighted in spots only, still presents many opportunities for the serious injury of workmen, either at their machines or who may have occasion to move about the shop.

A notable illustration of what is possible in the way of a well lighted plant is presented in the accompanying halftone, Fig. 1, which shows the interior of the Cincinnati Planer Company's new shop, at Oakley, Cincinnati, Ohio, as it appears under the illumination of the Cooper Hewitt lamps, located along the central and two side bays. The adequacy of the daytime illumination in this shop is a feature which has attracted the attention of visitors ever since the opening of the plant, but the fact that the artificial lighting system as here installed, gives almost equally good illumination with the same freedom from shadows, is not so generally known.

The photograph as here reproduced with absolutely no retouching, was taken during the month of March, at nine o'clock in the evening, without flash light and with an exposure of only four minutes, the illumination being supplied entirely by the Cooper-Hewitt lamps over-

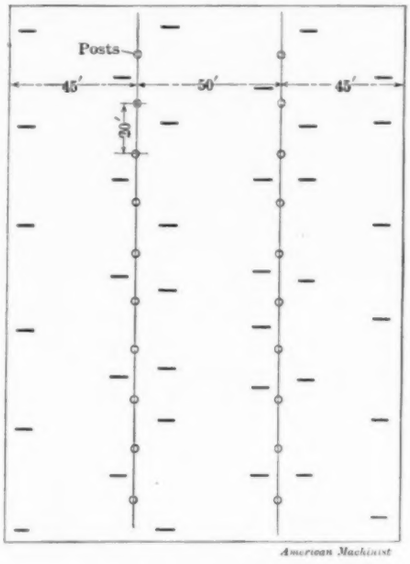


FIG. 2. SPACING OF LAMPS

FIG. 1. REPRODUCTION OF PHOTOGRAPH (WITHOUT RETOUCHING) OF CINCINNATI PLANER COMPANY'S SHOP EQUIPPED WITH COOPER-HEWITT SYSTEM OF LIGHTING

head. The distance included in the view from the foreground to the end wall is 320 feet, and yet the general shop interior, the work, the crane ways and other features are seen as distinctly as if the photograph had been taken in broad daylight. It is obvious that with illumination of this volume and character, the dangers which are peculiar to partially or improperly lighted factories, are entirely eliminated.

In that portion of the shop included in the illustration there are 49 lights. The single tubes used in the side bays are 21 inches long and 15 feet from the floor; they are spaced in the manner indicated in the sketch, Fig. 2. In the central bay, double tubes are used, these being 30 feet above the floor. The rated candle power of the lights is 300 for each single and 600 for each of the double tubes.

An Indicator of Novel Design

By C. L. Goodrich*

The halftone, Fig. 1, illustrates an indicator that is somewhat different in conception from the usual mechanical instruments utilized for indicating the truth of rotating work.

Referring to Fig. 2, the device will be seen to consist substantially of a glass mirror *A* with a short arm *B*, and a holder *C*, in which the mirror is held. The mirror swings on two small pivot screws. The short arm is brought in contact with the work that is to be indicated, and is under spring tension. Any eccentricity of the work causes swinging action of the mirror and by looking into the mirror and noting an object, say, 20 feet distant, a very small degree of eccentricity of the work will produce the effect of considerable movement of the object.

By substituting a reflecting concave mirror with focal distance of, say, 20 feet, it is possible to project a beam of light upon a graduated screen at that distance and this arrangement is in some instances, more convenient than the use of the plane mirror.

It may be well to state that the device has not as yet been put to any practical use, but the principle should be of interest.

*Department foreman, Pratt & Whitney Company.

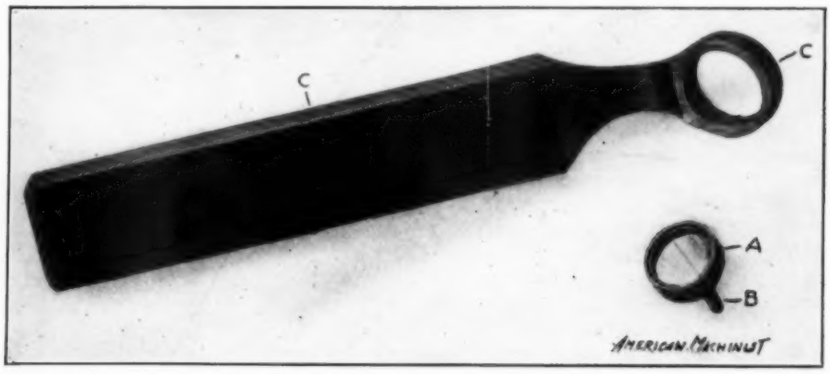


Fig. 2. An Indicator of Novel Design

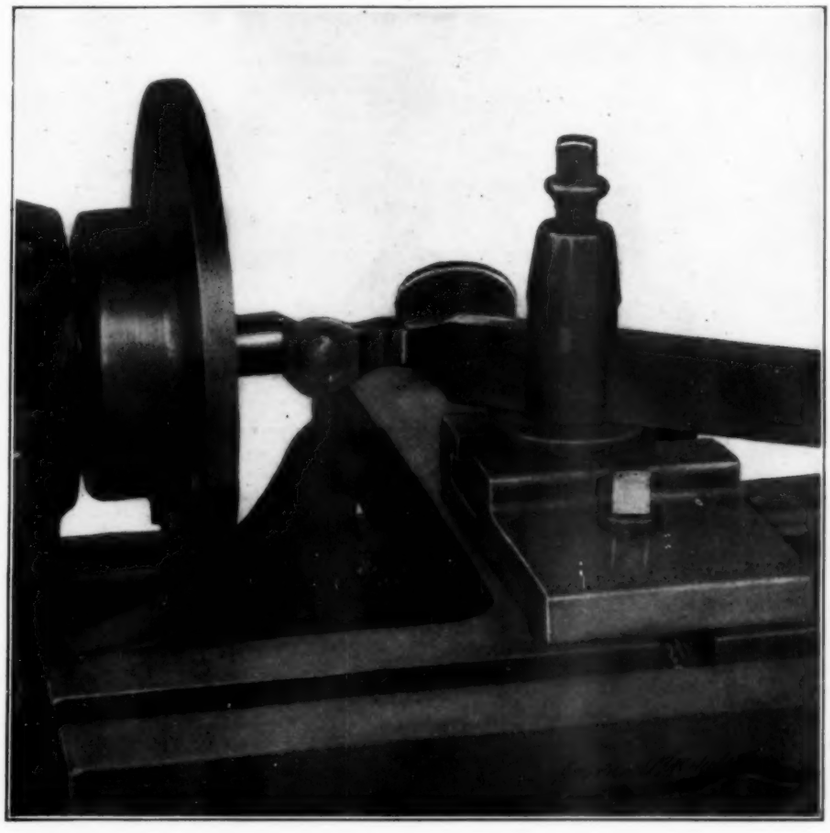


Fig. 1. An Indicator of Novel Design

Some Queer Notions of Business

By John R. Godfrey

The workings of the human gray matter, called brains, for short, is the eighth wonder of the world. And the devious reasonings are not confined to any one class, but reach from the cub to the all-powerful general manager.

Johnson wanted a lot of lathes for plain turning. Good husky turning it was, and so far as he could see they would wear out before he would ever put them on other work. But instead of buying plain lathes, having them built with a substantial feed of three, or at most four changes and no lead screw, he bought full fledged lathes, geared heads, 57 varieties of threads by a slight twist of the wrist and a jerk of the elbow and all the frills.

Never expected to use these attachments, but the lathes would sell easier if he ever wanted to get rid of them.

Case Number Two

Jackson was greatly impressed with a new tool holder that had been shown him by a traveler. Had one on his desk to look at and think over and it looked good to him.

But his keen business judgment got the better (?) of his sentiment and he discoursed thusly to the aforesaid traveler on his next trip:

"That tool holder looks good to me. I believe it would save time on the lathe. But I can't buy one or even try one. Why, I've got seven thousand dollars tied up in tool holders here and they've got to do. These might save a little money, but that seven thousand dollars has got to stay put."

And so he didn't buy any of the new tool holders for fear he would find out how much time he was losing on the old kind.

We are all too apt to overlook the fact that we buy machines and tools for the money they can earn for us and for no other reason. Unless a machine earns more than it costs, including interest and depreciation, it is a poor investment. And after it has earned its cost, we should figure it and all its earnings as a net gain.

And if, even before it has paid for itself, we find another machine which will earn a greater profit on the investment, a little figuring may show that we can afford to lose a little money on the first machine in order to get the new machine at work earning greater profits.

Where specific work is to be done, as in plain turning, the first object should be to get a machine which will do the work at the least cost of investment, operation and depreciation. Its second-hand value is hardly to be considered, unless we consider it a fly-by-night business, having no stability whatever.

And, whatever way we look at it, there seems to be no doubt that the old idea of the seller being under obligations to the buyer, is entirely wrong. We buy a machine when we believe it will earn more money than it costs and not because we wish to hand out charity to the maker.

On the other hand, unless the seller believed that the money would be of more value to him than the machine, he would not sell. So, why not recognize it as a fair exchange for the benefit of both and without obligations on either side? That's exactly what it is or at least should be.

Making a Grinder Head

Editorial Correspondence

Fixtures and methods used in making grinding heads interchangeable without elaborate expenditure for either jigs or machines.

Some of the fixtures and methods used in making the head for the Bath grinder are interesting and may offer suggestions which can be used in other lines of work.

The first operation is to plane both the top and bottom. These are planed with relation to the central core for the spindle boxes, so as to insure the outer curved surface being concentric with the hole when bored. The V's are then planed at an angle of 45 degrees and drilled for the gib-screw holes, as can be seen in Figs. 1 and 2. The angular piece *A*, which carries the bushing, fits into the cross slide of the head *B*, as can be seen in Fig. 1, the angle of the bearing surface on the fixture bringing the bushings vertical under the radial drill spindle.

Fig. 2 shows the piece taken out of the drilling fixture and the angular bush holder *A*, replaced in the same position as in Fig. 1. *C* shows the drill jig for the two holes *D*, which are located with regard to the shoulder for the spindle bushing inside the right-hand end of the head. The pin *E* goes inside the end of the bushing hole, striking the shoulder and locating the position of the two drilled holes, while a tongue on the back side of the drill jigs, insures that these holes be central with the planed grooves shown.

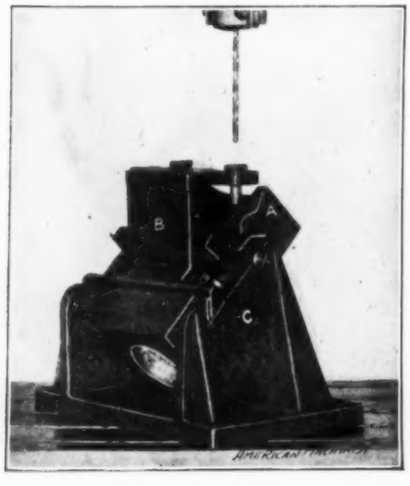


FIG. 1. DRILLING GIB-SCREW HOLES

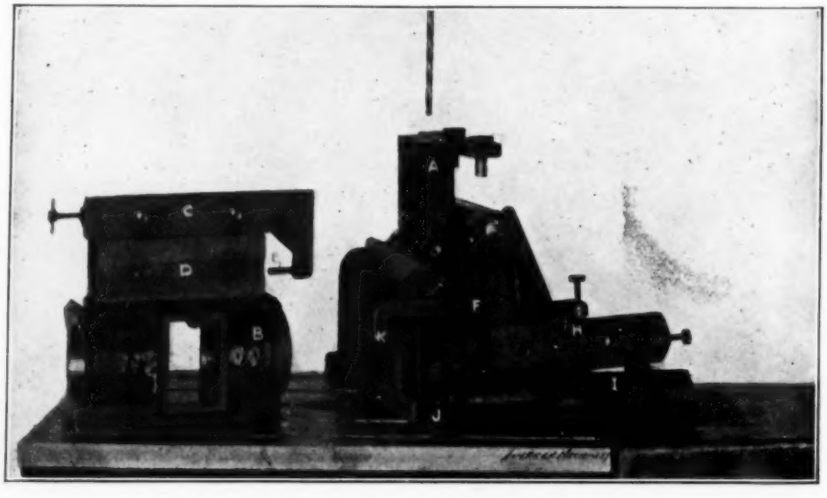


FIG. 2. OTHER DRILLING JIGS FOR GRINDER HEAD

The arm *I*, which is bolted to the head and which carries a tongue fitting into the grooves already mentioned, is drilled by the jig *H*, as shown. The overreaching arm *F* locates the distance from the flange end of the arm *J*, and the groove in the drill jig fits over the tongue, being drawn into position by the nurled-head binding screws shown. In this way the holes are drilled in duplicate which insures their being accurately located for the studs used.

BORING FOR THE BOXES

The next operation is boring the hole for the spindle bushing. For this purpose the angle plate *A*, Fig. 3, is provided with a dovetail arm *B*, on which the sliding surfaces of the head fit as at *C*. Before being bored, these slides are rough scraped so as to prevent the holes for the spindle bushing being thrown out of alinement by the scraping of the bearing to the face of the column.

The taper hole for the bushing is then bored to fit the plug gage shown on the cross slide and the hole recessed to the proper depth. They are bored 0.010 inch small, this being the allowance for grinding.

The faceplate *D* is then bolted to the regular lathe faceplate and the taper stud *E* indicated until it runs perfectly true. Then the finished bore is slipped over this and the piece held by the collar and nut shown for boring the other end. It is then ready for the grinder.

Fig. 4 shows how these are ground on one of the large duplex internal grinders, the work *A* being held in much the same way as on the faceplate by the taper mandrel and the nut and collar shown at *B*. The work is counterbalanced by the weight *W* so that it may be revolved smoothly in the grinder, and the holes ground to the correct size for the taper bronze bushing shown. It is interesting to note the large size of grinding wheel

used, as it nearly fills the hole, which is not usual in internal grinders, but which is a practice recommended by Mr. Bath where the machine has sufficient power to drive the wheel in such a case.

We are indebted to the Bath Grinder Company, Fitchburg, Mass., for the photographs and information as to their methods, the fixtures being designed by their superintendent, Mr. Moore.

An Indexing Problem

By M. E. Hoag

The problem herein described is one of a kind that may prove of interest and value.

It was required to cut the sector templet shown at *A* in the accompanying illustration. If the cuts in this sector had been equally spaced, it would have been a comparatively simple matter; but it will be seen that this distance varies and there are also two spacings of 5 degrees 47 minutes, which precludes the possibility of using an index circle with a practical number of holes, or of using differential indexing. It would have been possible to make a special circle with 540 holes, in which case each hole would equal 1 minute on the circumference of the work

$$(360^\circ = 21{,}600'; \frac{21{,}600}{40} = 540);$$

but even with this, it is doubtful if the spacing would have been sufficiently accurate.

The Method Used

To start the job, a block of cast iron about 1 inch thick was faced and bored for the ⅜-inch arbor that was to carry the work. The sector templet was laid out on a disk of steel and the ⅜-inch center hole bored. This and the cast-iron block were then assembled on the arbor, screws were inserted at suitable points to hold the two together and prevent chatter, and the two pieces turned to the correct outside diameter. The steel arm *I* was then made by drilling and reaming a ⅛-inch hole at *O* and inserting a plug; a locating button placed at *G* was micrometered with this plug so that the center distance was 5.000 inches. This was indicated upon the lathe faceplate and a ⅜-inch hole bored, after which the arm was assembled on the arbor so that the center lines of the sector and of the arm were at right angles to each other. In this position the two pieces were clamped together.

The milling machine and dividing head were set up in the regular way and the work placed between centers. With a Brown & Sharpe hight gage a reading was taken across the arbor at *G*, and the indicator arm plug at *O*, adjustments being made until the centers were exactly at the same level. This brought the center line of the sector central with the cutter, and the extreme readings of the indicator equally distant, or 25 degrees 36 minutes above and below center, making a total angle of 51 degrees 12 minutes.

Next the dividing head was rotated until the center of the plug was at *C*, 2.1604 inches below center, and the head locked. Readings with the hight gage were made again after locking, to prevent possibility of error. The first cut was now made and the head next turned until the plug was at *D*, in position for the second cut. This process was repeated for the remaining 8 cuts.

The method of obtaining the correct readings for the different cuts was a simple problem in triangles. The total reading for the extreme cuts is the chord of the arc *B C*, or *twice the sine of half the angle* × *the radius*, which equals 4.3209 inches and, as the readings are equal on both sides of the center, the plug *C* will be $\frac{4.3209}{2}$ or 2.1604 inches below center. As the advance for the second cut is 5 degrees 56 minutes, the distance of *D* below center in 5 × *sin.* 19 *degrees* 40 *minutes* = 1.6827 inches. This subtracted from 2.1604 inches = 0.4777 inches, the distance the plug must be raised for the second cut. The other readings are obtained in the same way.

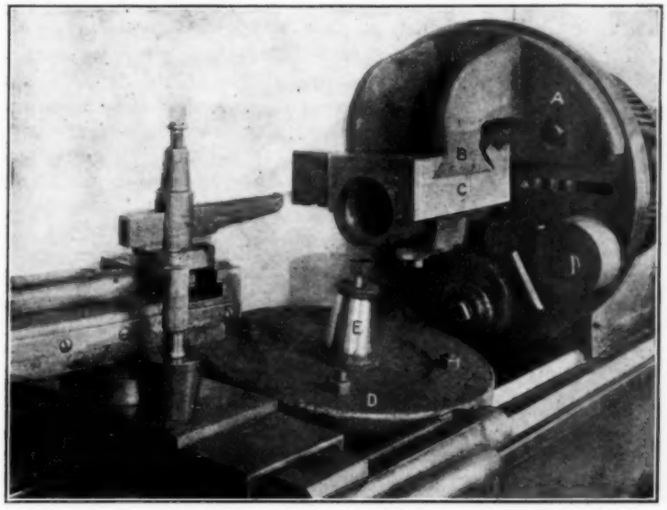


Fig. 3. Boring for the Bushings

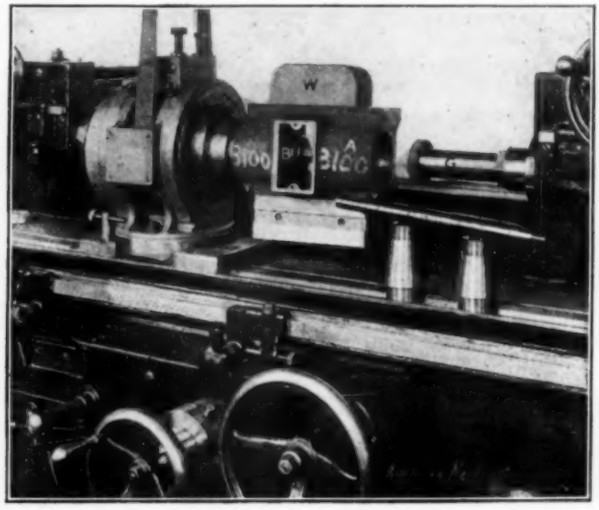
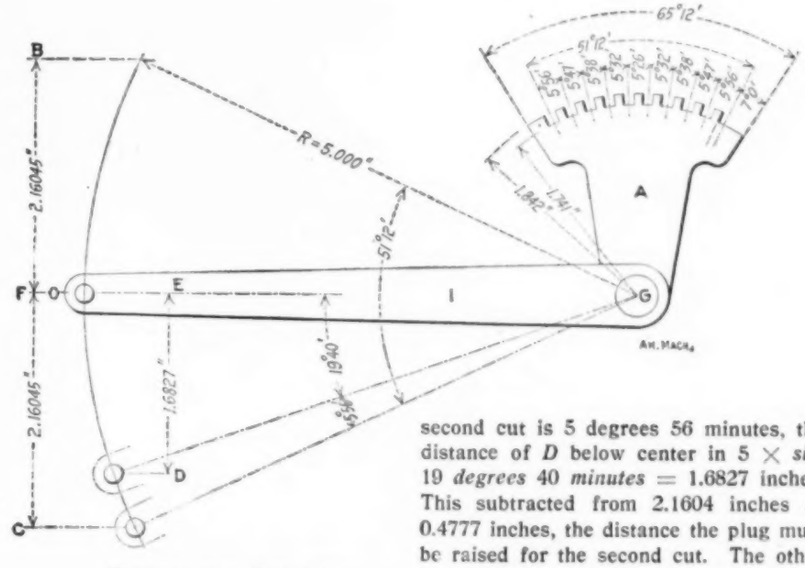


Fig. 4. Finishing by Grinding



Getting the Angles

A Sectional Truck for the Shop

Western Correspondence

A convenient system of truck and trays, the latter adapted to be stacked up on the truck, two, three or more high, or pushed about the shop floor upon their own casters, if desired. The truck proper is a low frame of stiff construction, and the trays are shallow receptacles fitted up internally for holding duplicate work of various kinds.

Adolph Muehlmatt, of Cincinnati, O., manufacturer of engraving blocks and tools, has recently applied the sectional principle to shop trucks and built for his own purposes a number of units that make it possible to use the trucks with one, two, three or more trays, according to the nature of the work and the maximum weight that can be conveniently hauled about the floor.

The Built-up Arrangement

The halftone, Fig. 1, illustrates one of these trucks on which are placed three work trays, each tray and the truck unit being equipped for holding 24 bases for engraving blocks. The various sets of trays, as will be seen from the different views, are adapted for taking care of some certain piece of work, and this constitutes one of the important features of the system.

The truck proper is of skeleton construction, as illustrated in Fig. 2, and, though light, is stiffly built. It is provided with four 1½-inch holes, two at each end, to admit the ball casters with which each tray is fitted, and which allow the trays when so desired to be freely pushed about the room upon their own casters, practically as independent trucks. Similarly, each tray has four holes in the upper face of its frame to receive the casters on other trays. This makes the ball casters with their cylindrical sockets, serve as dowels for the different truck sections; and whether there are two, three, or a half dozen trays piled up, the whole affair remains perfectly square, with all sides and corners in register.

Details of the Truck

The trucks are built up of 2-inch yellow pine, with a frame 5 inches deep, jointed at the corners, as shown, and secured by steel corner straps, and by carriage bolts down through the joints. Four half-inch through bolts or rods tie the frame sidewise, and it is further stiffened by the two bottom boards at the ends to which the brackets for the wheels are bolted.

The truck measures outside, 40x28 inches, and is mounted upon 4-inch wheels.

Tray Construction Which Is Adaptable for Various Purposes

The construction of the trays is represented in Figs. 3 and 4, the former showing the structure from top and bottom; the latter giving plan and sectional views.

The exterior dimensions are, so far as length and breadth are concerned, the same as in the case of the truck; the depth ranges in the different sets of trays from four to five inches, according to the character of the work to be handled in each set. Aside from the differences in depth, the trays are of uniform dimensions, exteriorly, though the inner arrangement is in each group of trays modified to conform to the requirements of the particular line of parts to be taken care of.

Fig. 1. Sectional Truck with Wheel Section and Three Work Trays

These illustrations bring out clearly the method of constructing the framework of the trays, with strongly jointed and reinforced corners, and with four half-inch through bolts, which tie the framework sidewise and also support the bottom boards of the tray. The halftone, Fig. 3, also illustrates clearly the ball casters at the bottom of the tray and the corresponding pockets in the top of the next tray which admit the cylindrical caster shells, and are sufficiently deep to clear the bottom of the caster ball, thus permitting the trays to stack up more compactly, neatly, and with perfect security against possibility of displacement, except when lifted directly from the supporting tray beneath, or from the truck base, as the case may be.

Strength and Rigidity

That the trucks and trays have been designed with a view to standing up under severe service and to last indefinitely will be apparent upon consideration of the different illustrations, showing details of the method of securing the various members entering into the construction of each unit. Wherever possible, and this applies at nearly every point, bolts have been used in place of screws; for example, in securing the corner joints, attaching the handles, etc.

An important feature in connection with the vertically placed carriage bolts in the corners is that when the trays are stacked up on the truck, or upon each other on the floor independently of the truck section, the bottom ends of the bolts in the top tray rest directly upon the heads of the bolts in the tray next below, and so on down with the remainder of the units; thus the entire load of trays and work, whatever it may be, is taken directly upon these bolts and trans-

ferred to the bottom support without unduly straining the framework of any of the trays.

Interiors of Trays

The interiors of the trays for holding parts under process of machining or ready for assembling, and for completed work ready for packing, are laid out with an equal amount of forethought, and attention to these details is well repaid when results are considered; for, in the shop where these trucks are used, the castings or forgings from the moment they start out in the rough, until they are finished (and even after, in many cases, nickel plating and assembling), are taken care of in the trays and moved about in no other way, except, of course, in placing them in the machine tools and removing when the machining operation is accomplished.

As some of the parts of the engraver's blocks, forming the chief product of the shop, require a large number of machining operations, and correspondingly numerous handlings, every little detail that will facilitate the picking up of the piece, its restoration to the tray when the operation is completed, and its retention in position where it will not injure or be injured by its fellows is of considerable importance. It is also important to safeguard the tray itself and so prolong its life, by so arranging it that the workman can easily pick up and replace work gently without having to drop it in order to save his fingers. How these points have been covered in the working out of the tray details is best shown by the line drawings and sketches, Figs. 4 to 6 inclusive.

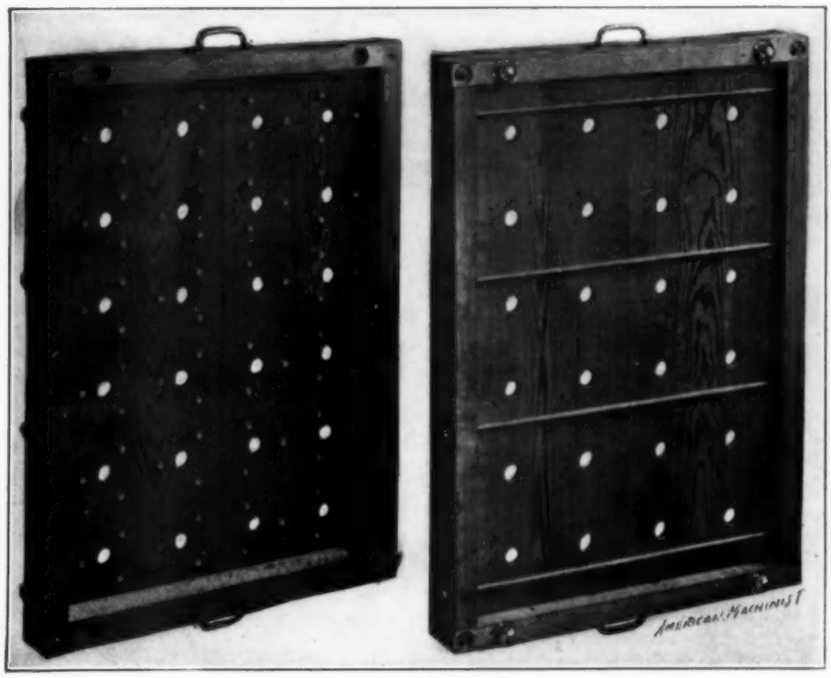


Fig. 3. Top and Bottom Views of One Type of Tray

Holding Bases for Engraver's Blocks

The hemispherical castings represented in Fig. 1, in the top tray, are engraving-block bases about 5½ inches diameter. The positions of the supporting and retaining pegs in this set of trays are best indicated by the drawing, Fig. 4, which represents the layout for 24 such bases. There is a good-sized central hole in the flat side of the casting, and wood pegs 1½ inches in diameter are spaced at equal distances apart in the tray to locate the hemispheres, while their weight is taken upon three smaller pegs fitted half way down in the tray board and projecting above the surface about ½ inch. The large peg is also entered half way through the bottom board and secured by a wood screw, as represented in the detail to the right of the drawing.

The turntable or vise which fits on this hemispherical base in the engraving block, is provided with a short shank or spindle, fitting the chamber in the base and about which it rotates; and these

Fig. 2. Trucks and Trays

turntables are taken care of in trays like those seen in Fig. 3, which shows opposite sides of two receptacles. Here, instead a central post, the tray has for each piece of work, a clearance hole for the shank, but the work is supported as in the other case, upon the three projecting pegs. In this way the work is kept far enough away from the tray bottom to permit its being picked up easily with the fingers, the tray is readily kept free from grease and dirt, and splintering of the woodwork is entirely obviated.

Arrangement for Holding Chuck Jaws

A type of tray adapted for holding lower jaws for engraving blocks is shown in Fig. 5, where the jaws are represented as placed in pairs between retaining strips, attached to the bottom boards of the tray. After these jaws have passed through the various processes leading up to and including the fitting in of the operating screws, the jaws with the screw in place are stored in the same type of tray, but in this instance they are turned crosswise so that the projecting screws pass over the separating strips and do not interfere with the compact grouping of the work in the channels between the strips. The tray in the background of Fig. 2 is shown loaded with chuck jaws arranged in this manner.

the bottom admits the temporary shank of the blank which is used for holding the piece during machining operations.

While the illustrations in this article represent the special adaptations and grouping trays to conform to the requirements of this particular shop, it is obvious that they may be readily modified to answer the purposes of any establishment manufacturing a line of work where many pieces of a kind must be handled

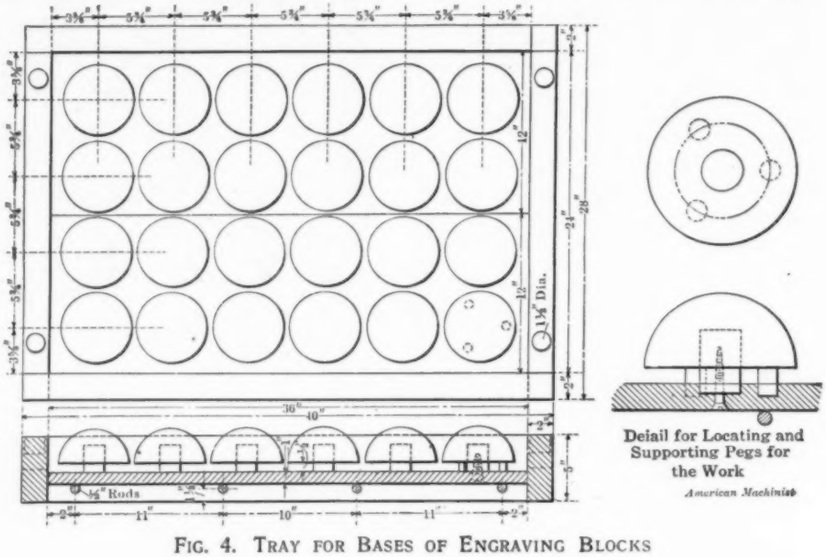


Fig. 4. Tray for Bases of Engraving Blocks

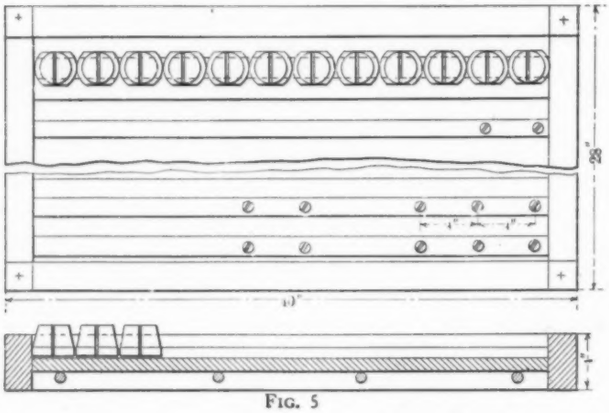


Fig. 5

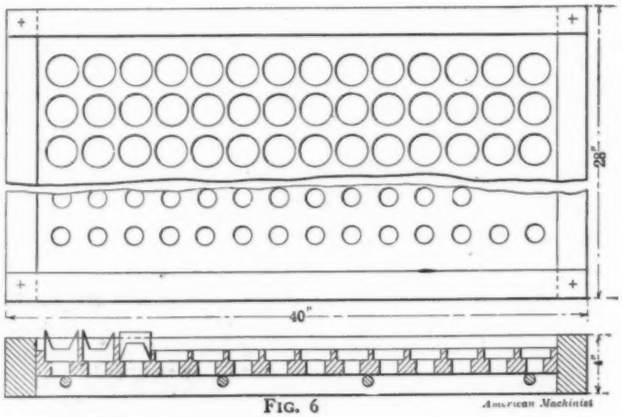


Fig. 6

Truck Trays for Holding Engraving-block Jaws

Still another tray interior is represented in Fig. 6, for receiving the upper jaws, which are made to be mounted upon the main or lower jaws, and which receive in their turn, attachments of various kinds for holding special classes of work for engraving. The blanks for these upper jaws in pairs are carried well along toward completion before sawing apart and a tray nearly full of the blanks before finishing, along with quite a number of pairs of jaws cut apart is shown in the foreground of Fig. 2. The sectional view in Fig. 6 illustrates the double-bottom construction used in this instance for holding the work either side up. This gives two diameters for each opening in the tray bottom, and the smaller hole at constantly, yet in such a way as to avoid mutilation through direct contact with one another.

New Steel Process

In a consular communication from the United States consular agent at Wiesbaden, Germany, attention is called to a new process for making steel, which is said to be equal to crucible steel, although made without crucibles, and which is becoming a competitor of electrosteel because, while of equal standard in quality, its cost of production is supposed to be only one-tenth that of electrosteel. The company that owns the patents of this new process has offices in Wiesbaden, Frankfort on the Main, and in London and is reported to have established two plants in Sweden, one in Scotland, and one in Germany, for manufacturing this new steel.

The principal advantages claimed for the process are: (1) The construction and working of the furnace is simplified; (2) the heat of the furnace can be controlled more quickly and more exactly in the open hearth than with ordinary firing; (3) intermittent working is facilitated, the furnace being quickly brought to full heat after standing idle; (4) the charge can be melted and treated more quickly than by the ordinary method, hence the output of a furnace of a given size is increased and the cost of labor reduced; (5) the charge can be kept in a perfectly liquid state throughout, so that it is not necessary to use the last of the contents of the furnace for ingots, as is now usually the case. One of the most remarkable qualities of this steel is that it shrinks only half as much as ordinary cast steel. Thus, a product equaling crucible steel can be produced in the open-hearth furnace.

Making Computing Scale Parts

By F. A. Stanley*

Special fixtures used for drilling, profiling and milling platform skeletons, levers, lever stands and other important members of automatic computing scales. Details of devices incorporated in these tools for gripping and supporting the castings under operation.

Methods and appliances for preparing the castings for the reception of the agate bearing blocks which receive the knife-edges on the scale lever; and a bench fixture that sets these agate bearings in position, by placing them squarely in their seats after they have been coated with cement.

A set of gages for facilitating the setting of the knife-edges in the scale lever, and for testing the accuracy of their positions after they are inserted.

In an earlier issue of the AMERICAN MACHINIST, an illustrated description of the Computing Scale Company's plant at Dayton, Ohio, was published, without, however, any detailed information pertaining to the manufacture of scale parts. The purpose of the present article is to show some few of the many interesting shop methods utilized by the firm in producing its scales of various types, with special reference here to the machining of certain important parts of the "Automatic Computing Scale."

This scale, as most readers who do any of their own marketing are aware, carries at the rear, and upon an upright frame, a horizontal, cylindrical chart, which is rotated by the pull of the platform lever, when any article is being weighed, and the weight and commercial value of the purchase are indicated immediately by the graduations and numerals upon the chart face.

PLATFORM AND LEVER ARRANGEMENT

The glass platform on this type of scale rests upon a cast-iron frame, known as the "platform skeleton" and supported in turn, upon the horizontal scale lever, and by the vertical "check steelyard" at the rear, the lever being fulcrumed at the front end upon a stand mounted on the base of the scale. The platform skeleton is shown on the drill-press table in Fig. 1, which represents one casting clearly, from the underside, while another skeleton is seen right side up, in place in the drill jig. The diagram, Fig. 2, is a side view of the platform apparatus, while Fig. 3 shows the complete skeleton; Fig. 4, the check steelyard; Fig. 5, the lever; and Fig. 6, the lever stand.

It will be gathered from the sketch, Fig. 2, that the heavy glass platform is seated upon four brass pins in the skeleton which are provided with conical heads entering shallow depressions in the lower face of the platform. The cast-iron skeleton has two depending lugs at opposite sides, which are milled out to receive agate V-blocks for bearings, these resting upon hardened-steel knife edges in the sides of the lever. The knife edges at the front of the lever, take a bearing in two agate V's secured in the jaws of the casting marked "lever stand" in the sketch.

The knife edges in the rear end of the lever take a bearing in a hardened-steel loop, which with the vertical hook, forms the connecting medium with the weighing apparatus above. The front of the lever is provided with a counterbalance to equalize the weight of platform and skeleton and so relieve the upper bearings of unnecessary strains.

*Western editor.

FIRST OPERATIONS ON THE SKELETON

The platform skeleton, shown in Figs. 1 and 3, is brushed off with a file on the four spots on top, opposite the round bosses that have to be drilled, and with these bearing spots leveled off, the casting is ready for the jig, Fig. 1, in which the holes for the four brass platform pins are drilled and reamed, two smaller holes drilled and tapped for screws for holding a nickel-plated grill or guard behind the platform, and four holes drilled for attaching the vertical check-steelyard to the rear end of the platform skeleton.

The jig is of open form, with four clamps operated by thumb screws to secure the work, which is located by suitable stops. There are enough spindles in the drill to take care of the various tools required for these operations, and the light jig and work are easily slid from one spindle to another. For reaming and tapping and for countersinking the bottom ends of the four holes for the brass pins, the jig and work are turned bottom side up on the table.

PROFILING ENDS OF PINS

Following the drill-jig operations, the platform skeletons are fitted with the four brass pins which are driven in from the top and riveted over on the bottom. The casting is then placed in the profiling fixture, Fig. 7, where the ends of the pins are faced off to uniform hight and the seat for the check steelyard finished with the small mill shown.

The work rests in this fixture, upon the two-forked lugs at the sides, and on the heel or rear end of the skeleton, which is supported upon a stud or post. This provides a three-point bearing, and after the casting is placed in the fixture, the four spring supports at the corners are allowed to rise into contact with the underside of the work, after which they are secured by the set screws. The rear end of the work is secured between jaws, one of which is pivoted and actuated by a set screw to grip the casting. Thus the skeleton is held against springing during the profiling operations.

The hight gage at the rear corner of the profiler table is a bent rod secured in a block, and with the point ground off to represent the exact hight at which the casting is to be faced. The spring supports at the corners of the fixture are constructed as indicated in the sketch, *A* Fig. 8, and the sharp gripping jaws referred to are placed as represented at *B*.

MILLING SEATS FOR AGATE BEARINGS

The fixture, Fig. 9, is used for milling the slots in the platform skeleton for the reception of the agate blocks, and at the same cut the ends of the lugs are faced off, a gang of three cutters being carried on the arbor of the Lincoln type miller. The slot is milled 0.455-inch wide and ¾ inch deep.

The work rests for this cut, upon the four brass pins, which serve as feet during this, and some later operations. This, of course, assures the cutting of the seats for the agate bearings exactly parallel with the faces of the pins, and when the same resting points are used for other cuts, the surfaces produced will be square with the faces finished in the operation illustrated in Fig. 9.

The brass feet rest upon hard-steel plates let into the fixture face, and four clamps actuated by thumb screws, secure the work against lifting. Two wedge-shaped shoes adjusted on inclined guides by means of nurled-head screws, act against the under surface of the work, one at each end, to support it directly under the cutters. One of these adjust-

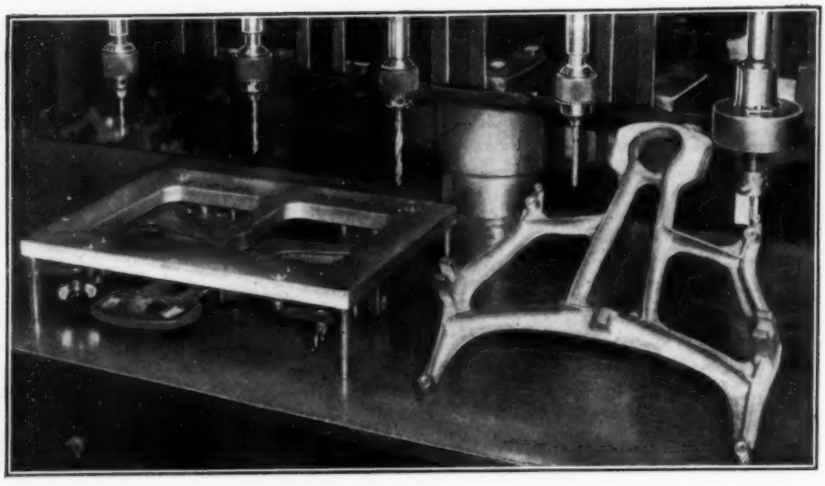


FIG. 1. PLATFORM SKELETON FOR COMPUTING SCALE, AND JIG FOR DRILLING IT

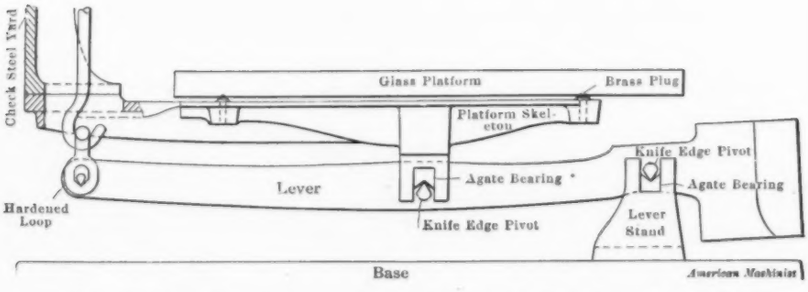


FIG. 2. SIDE ELEVATION OF COMPUTING-SCALE PLATFORM, LEVER, ETC.

able shoes is visible at *A*, in the halftone, and the heads of both screws *B* are plainly shown at the side of the fixture.

LOCATING THE CASTING

The method of locating the skeleton casting sidewise prior to clamping it and adjusting the supporting wedges, will be seen in Fig. 10, which is merely a diagrammatic sketch to show the general principle of the locating device, without including the other features of the fixture.

Here the work is sketched in partially, with the two slotted lugs in position for milling, at *C*, *D*, the end at *C* being drawn up against the V-shaped locating plate *E* by two hook bolts, and the other end *D* having a sliding, locating V-block *E*, which is adjusted against the work by means of nurled-head screw *G*. This screw has a collar which enters a groove in the rear end of the sliding V-block and moves the latter easily when turned by the fingers. Both locating blocks are provided with clearance channels to allow the cutter to pass through freely.

A gage is shown at *H*, Fig. 9, which is applied to the work to test the hight of the lugs as milled off at the same moment as the slots are cut to width and depth.

MILLING TO WIDTH OVER ALL

The operation in Fig. 11 is the straddle milling of the outer side faces of the lugs which were slotted in the fixture just described. The fixture, Fig. 11, receives the work bottom side up, and upon its brass pins as in the previous case, and here it is held against end thrust by two narrow stop plates *I I*. It is located at the end by a plate with pointed ends which centers the casting by the 1 11/16 cored hole, as shown in Fig. 12. The holding-down clamps at the outer corners of the fixture, Fig. 11, come directly over the brass pins which act as feet, and these pegs again rest upon hardened-steel plates, secured to the fixture face. There are two other straps to secure the casting near the middle, and these act directly over a pair of supporting devices that are not visible in the engraving.

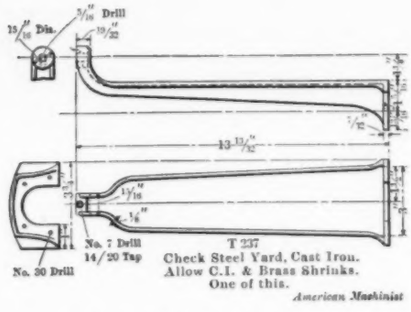


FIG. 4. CHECK STEELYARD

An interesting feature of the operation is the application of a spacing strut or inside brace *J*, which is placed between the two lugs as indicated, to prevent them from springing inwardly under the side pressure of the milling cutters. This bar is turned at both ends to enter the milled slots, and one end is threaded to receive a nurled nut, so that when drop-

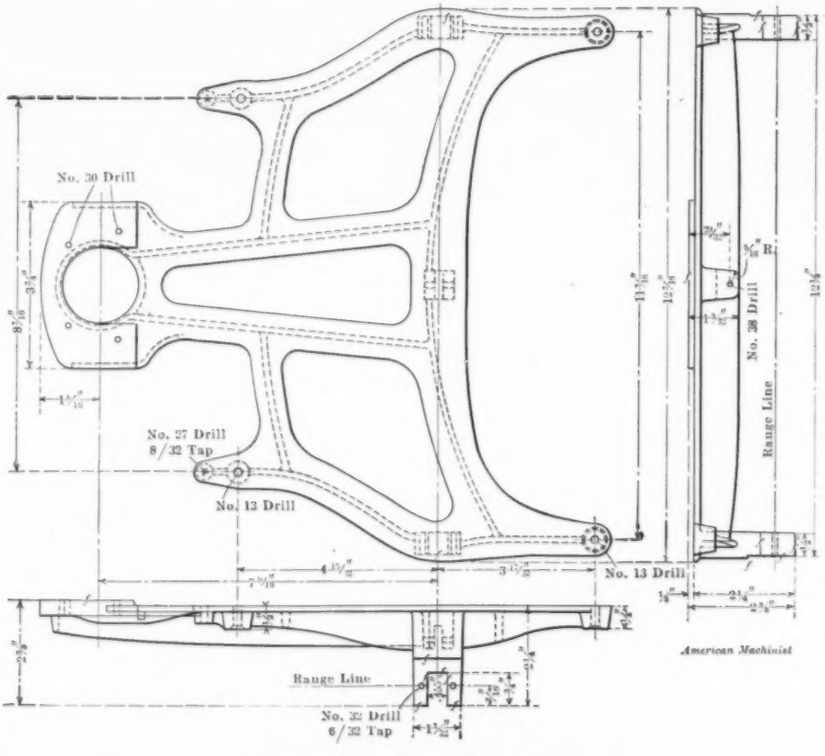


FIG. 3. PLATFORM SKELETON

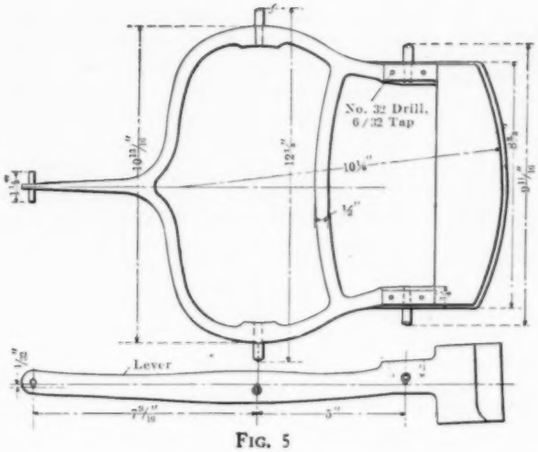


FIG. 5

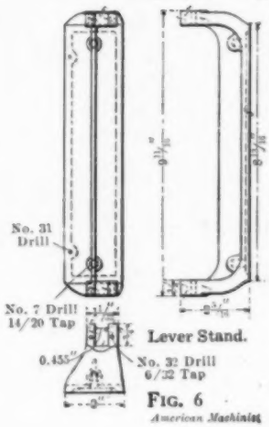


FIG. 6

LEVER AND LEVER STAND

ped into place, a slight turn of the nut adjusts the device firmly between the inner faces of the lugs. The nut being cylindrical and operated solely by the fingers, there is little danger of its being set so hard against the casting as to spring the lugs. At the same time it does present all the resistance required to offset any tendency for the cutter teeth to force the lugs toward each other. The gage for testing the width over the lugs is shown on the table, in front of the fixture.

Both milling operations in Fig. 9 and 11 are accompanied by feeding the work past the cutters and back again before removing it from the fixture.

A FACE-MILLING PROCESS

Fig. 13 represents another milling operation, the facing off of the top and bottom of the "check steelyard," shown in detail in Fig. 4. Two castings are milled at once in the fixture, with a pair of inserted-tooth cutters carried on the spindles of the double-head miller. As shown in Fig. 2, this check steelyard, or "back bar," is attached to and acts in conjunction with the skeleton carrying the platform, and it takes the place of check rods. It must be faced square on the bottom, which is fitted to the platform skeleton, and the boss at the top must be faced off a certain distance from the base so as to form a proper connection with the controlling apparatus above.

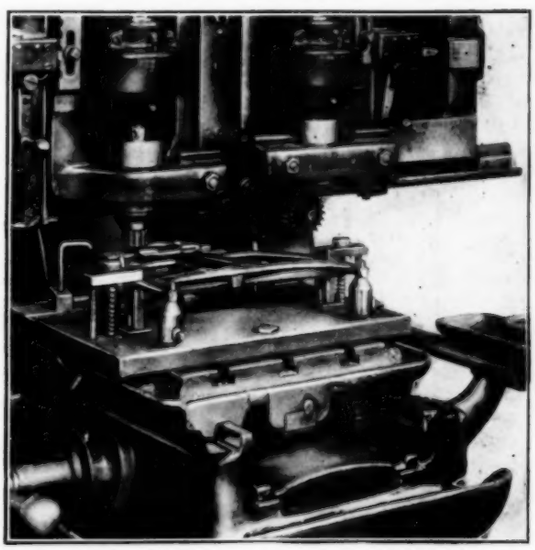


FIG. 7. PROFILING OPERATION ON THE PLATFORM SKELETON

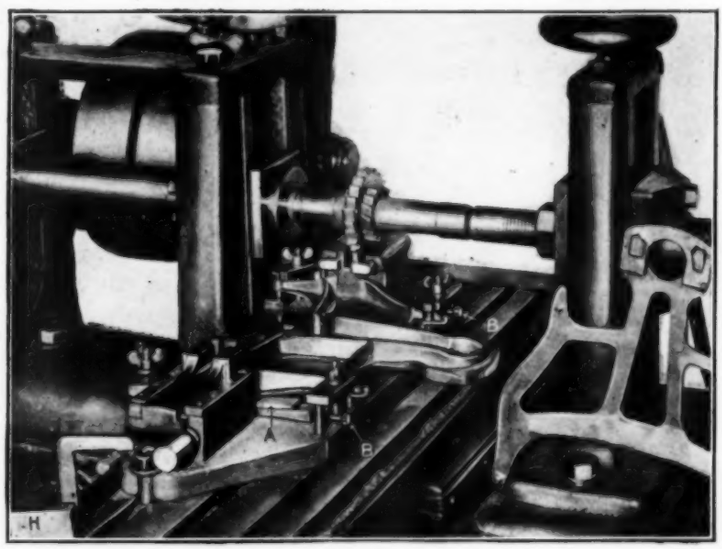


FIG. 9. MILLING SEATS IN PLATFORM SKELETONS FOR AGATE BEARINGS

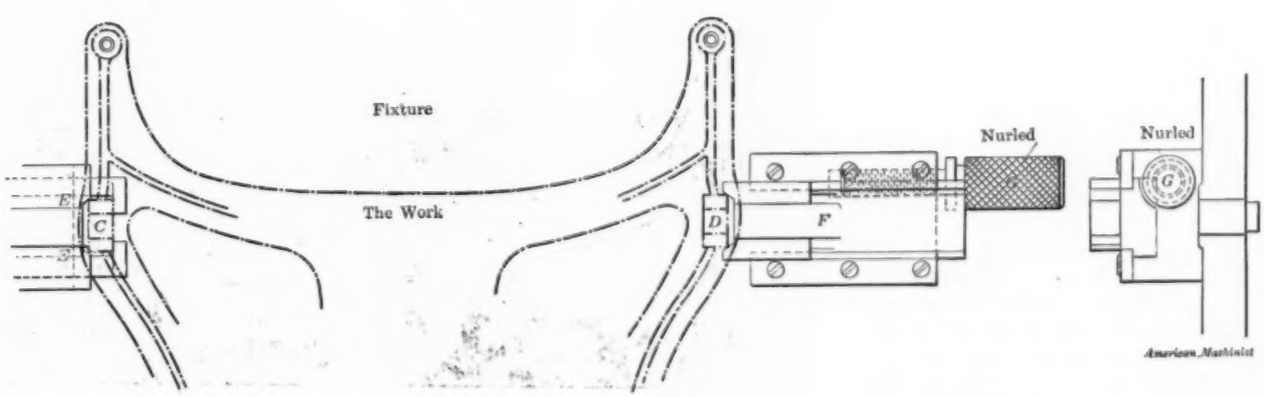
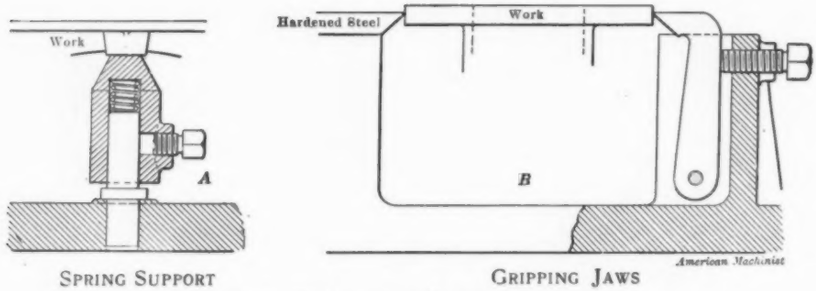


FIG. 10. METHOD OF LOCATING PLATFORM SKELETON ON SLOT-MILLING FIXTURE



SPRING SUPPORT GRIPPING JAWS

FIG. 8. FEATURES OF PROFILING FIXTURE

The casting to be milled is placed with the under side of the curved neck in contact with an end stop, and held to its seat in the fixture, Fig. 13, by a strap that acts upon both pieces as indicated in the illustration. The sketch, Fig. 14, shows how the fixture is designed to draw the work snugly to the end stop when the clamp is tightened, the left-hand end of the piece resting upon a bevel-edged plate, which tends to keep the casting up to the stop.

The work as it comes from the miller is tested for hight on the bench plate, Fig. 15, with the simple gage there shown as applied to the casting.

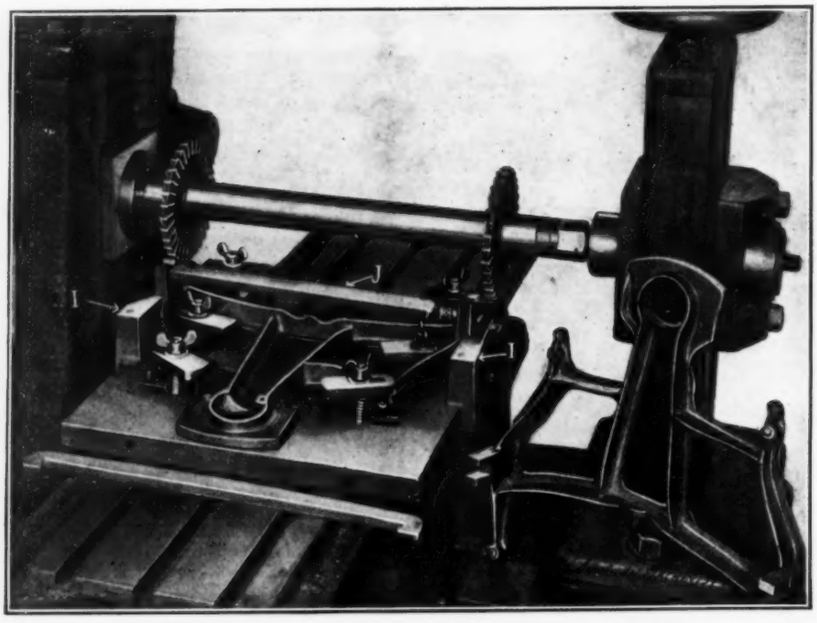


FIG. 11. MILLING SIDES OF LUGS FOR AGATE BEARINGS

SETTING AGATE BEARINGS

The agate blocks referred to as used for bearings in the forks of the platform skeleton and the lever stand, are cemented in place in the slots, a fixture, Fig. 16, being employed for aiding in the setting process. This view illustrates the application to the lever stand, but the method is precisely the same in setting the agate bearings in the platform skeletons. The lever stands, by the way, are machined in much the same way as the skeletons for the platforms, and it is therefore unnecessary to illustrate the fixtures for milling them.

The fixture, Fig. 16, has a seat for the finished casting, which is to receive the piece of agate, and two vertical posts are provided as guides for the bar *K*, which carries two knife edges on its lower face. The two pieces of agate are coated with the cementing material, placed V up in the slots in the casting, and the bar *K* pressed down upon the agates, seating them firmly and evenly in position. A number of lever stands with their agate bearings set, are shown in the engraving, and several dozen of the bearings themselves ready for setting are also visible, at the end of the bench plate.

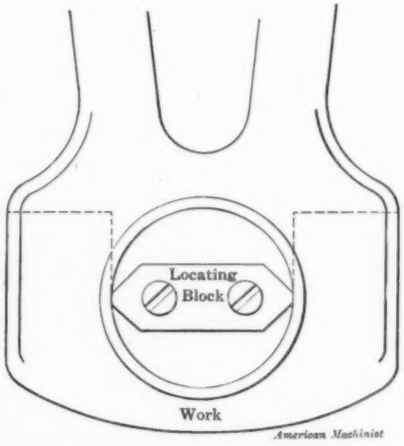


FIG. 12. LOCATING BLOCK FOR MILLING FIXTURE

TESTING POSITIONS OF KNIFE EDGES IN LEVERS

A set of gages is illustrated in Fig. 17, for testing the knife edges in levers, to determine if they are properly located and their faces correctly set in reference to one another. Gage *L*, for example, is designed to span the lever frame and

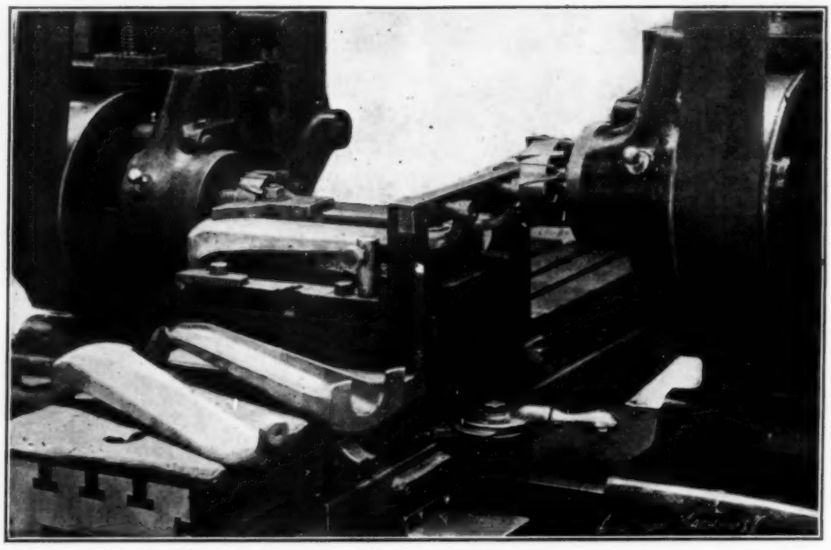


FIG. 13. MILLING ENDS OF CHECK STEELYARDS

rest upon the corresponding faces of two knife edges, as in Fig. 18, to find if these angular faces are precisely in the same plane. The shanks of the knife edges are turned to fit tight in the holes in the lever, and in setting, they are twisted until brought into the one plane.

Gages of the type shown at *M*, Fig. 17, are used for testing the distance from one pair of knife edges to the next pair. Gage *N* is applied to the entire set of knife edges, just as illustrated, to determine the accuracy of the whole series. It will be noticed by referring to Fig. 5, that the bearing points of the knife edges at the front and center of the lever, are on the same line, but the knife edges at the rear end are 1/32 inch lower. The gage *N*, Fig. 17, hooks under the front pair of knife edges, rests upon the pair near the middle of the lever, and extends down flush with the rear knife edges. Any inaccuracy in the location of the series will at once be revealed upon the application of the gage.

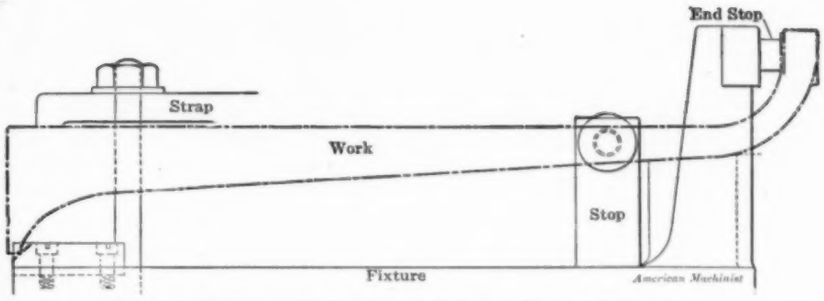


FIG. 14. STOPS IN FIXTURE FOR MILLING CHECK STEELYARDS

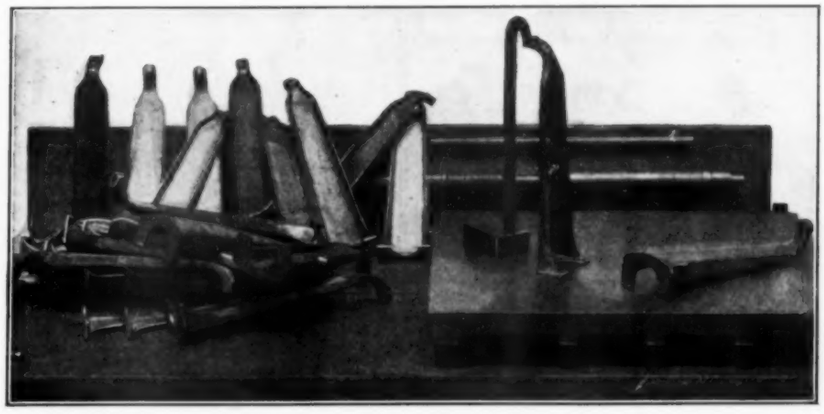


FIG. 15. GAGE FOR TESTING OF WORK

The latest reported application of the gyroscope is that to a motor car for the purpose of preventing skidding. An English paper reports a demonstration in which the experiment is said to have been eminently successful. The demonstration consisted of driving cars, both with and without the device, at fair speed over a thick patch of a mixture of Thames mud and soft soap. In the middle of this greasy mess the brakes were applied with sufficient force to lock the wheels, and it was shown beyond dispute that while an ordinary car with plain rubber tires would slew around, another vehicle fitted with the gyroscope apparatus would hold on a steady course without the slightest deviation from the line set by the steering wheels. A writer commenting on the demonstration pointed out that the questions arose as to the liability of the gyroscope to damp the engine when quick acceleration was necessary, the effect upon the steering of the vehicle, and the possibility of undue strain being thrown upon the frame of the car when the force of the gyroscope came into opposition with the tendency to skid.

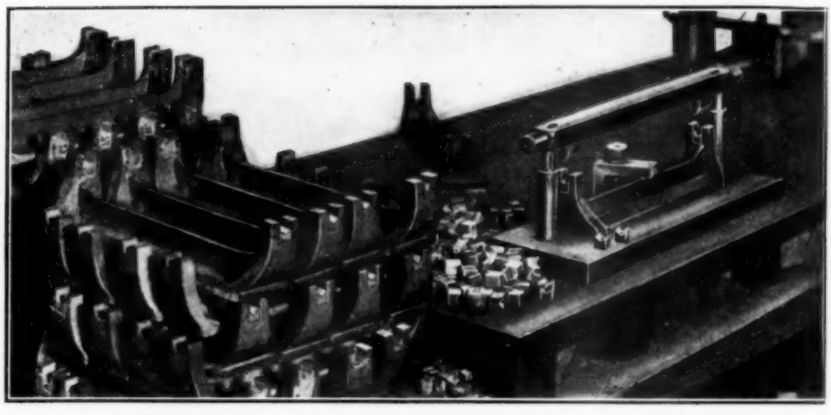


FIG. 16. FIXTURE FOR SETTING AGATE BEARINGS IN LEVER-STAND

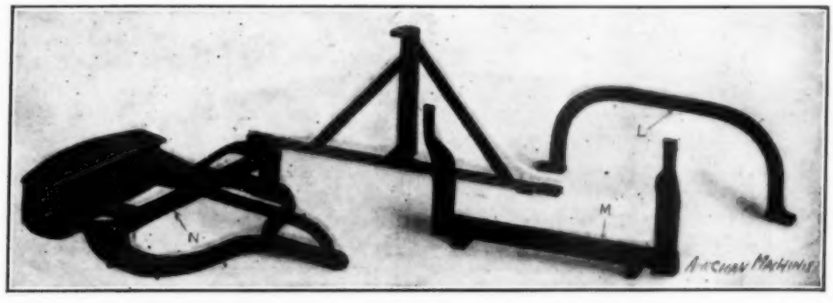


FIG. 17. GAGES FOR TESTING KNIFE-EDGES IN SCALE LEVER

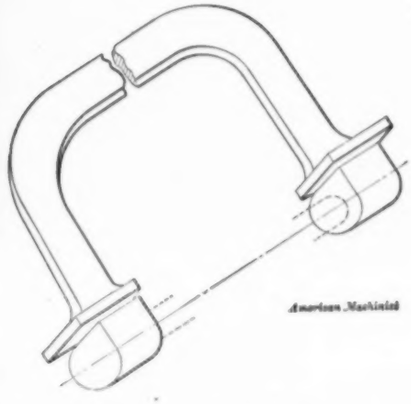


FIG. 18. GAGE FOR TESTING A PAIR OF KNIFE-EDGES IN SCALE LEVER

Design of Hydraulic Press Beams

By A. Lewis Jenkins *

Various forms and materials of beams used for the resisting member of a hydraulic press.

Wooden and structural steel beams. Cast iron beams of box and of ribbed construction.

Formulas for obtaining the bending moments for various loadings and for figuring the stresses in the material.

*Assistant professor of mechanical engineering, University of Cincinnati.

The beam, or press head, for a hydraulic press requires equally as much consideration as the cylinder. The problem of selecting the type best suited for a given condition is more a question of cost than appearance. Hence, we frequently see a press performing its duty with perfect satisfaction that may be subject to severe criticism from the standpoint of appearance.

Beams are made of wood, structural steel or cast iron; depending upon the load, relative costs and the purpose of the machine.

Different Types of Beams

Wooden beams, as shown in Fig. 1, are extensively used on wine and cider presses having a capacity of 60 tons or less. This construction fills the requirements for a cheap machine of small capacity when the appearance is not a consideration. On machines larger than 40 tons capacity these beams are very large and bulky. The beam shown in Fig. 2 consists of four structural steel I's, fastened together by tie rods and cast-iron separators. This type of beam is extensively used on general-purpose presses and has a wide range of application. The unit working stress is usually about 15,000 pounds per square inch; but in case of very long beams, such as used on double-cylinder belt presses, the deflection should not exceed a certain amount, and it is sometimes necessary to use a working stress as low as 10,000 pounds. The largest beam of this construction consists of four 24-inch I's each weighing 100 pounds per foot and, with ordinary loading and length of span, will safely carry about 450 tons.

In some cases where the load is less than 200 tons, and very much concentrated, two instead of four I's are used. In this case it is necessary to use strain loops, or a cross beam to receive the strain rods.

Structural-steel channels also are used in beam construction and are especially well adapted to curb, belt and hand presses. These beams consist of two channels, which are riveted to two channel uprights and reinforced by angles, as shown dotted in Fig. 3. The largest channel has a section modulus, equal to 57.4, and a beam consisting of two such channels will resist a bending moment of about 1,725,000 inch-pounds, which is usually sufficient to carry a load of about 75 tons.

Cast-iron beams are used more than any other, and there is practically no limit to their size. The box or cored beams shown in Figs. 4 and 5, present a better appearance than any other type and, by making the top thicker than the bottom, it is possible to obtain a very economical distribution of metal; although they are usually more expensive to make than the ribbed beam shown in Fig. 6.

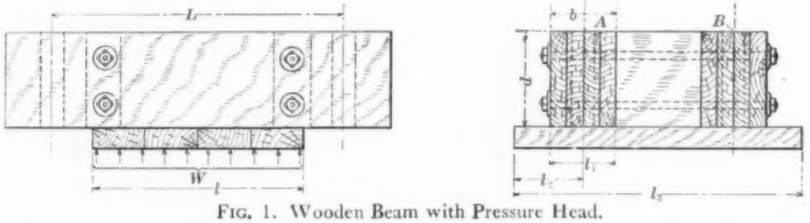


Fig. 1. Wooden Beam with Pressure Head.

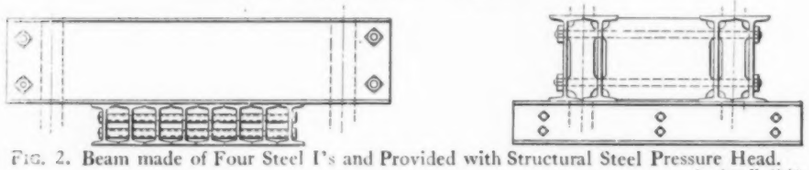


Fig. 2. Beam made of Four Steel I's and Provided with Structural Steel Pressure Head.

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Formulas for Wood and Structural-steel Beams

The wood and structural-steel beams shown in Figs. 1, 2 and 3, are subjected to a load of W pounds uniformly distributed over a length l and supported by the strain rods. Denoting the length between the strain rods by L, the bending moment at the center is:

$$M = \frac{W}{2} \times \frac{L}{2} - \frac{W}{2} \times \frac{l}{4} = \frac{W}{4}\left(L - \frac{l}{2}\right) \quad (1)$$

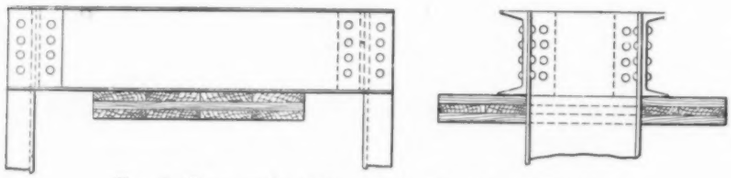

Fig. 3. Beam made of Two Steel Channels and Provided with a Three Ply Wooden Pressure Head.

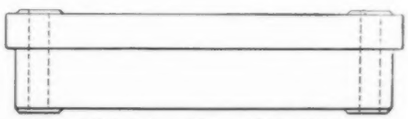

Fig. 4. Cast Iron Beam of Box Type with Flat Top.

Fig. 5. Cast Iron Beam of Box Type with Curved Top.

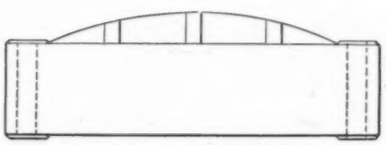

Fig. 6. Ribbed Cast Iron Beam.

By substituting the value of the bending moment in the fundamental formula

$$M = \frac{SI}{c};$$

where

S = Working stress in pounds per square inch;
I = Rectangular moment of inertia about gravity axis;
c = Distance from the gravity axis to the top of the beam;

we have

$$\text{Modulus of section} = \frac{I}{c} = \frac{W\left(L - \frac{l}{2}\right)}{4S}. \qquad (2)$$

By substituting the given values of W, L, S and l in this equation, the required modulus of section may be found. If constructed as shown in Fig. 2, the required size of the I's is determined by referring to the hand book and selecting one having a modulus of section equal to $\frac{I}{4c}$, there being four beams used. For the beam shown in Fig. 3, two channels, each having a section modulus equal to $\frac{I}{2c}$, are selected. The size of the wooden beam shown in Fig. 1 is determined by assuming values for the breadth b and depth d, and substituting in the formula:

$$b = \frac{3W\left(L - \frac{l}{2}\right)}{4Sd^2}.$$

This is for a beam composed of two elements, A and B, as shown in Fig. 1.

Formulas for Cast-iron Beams

The shape, and also the method of calculating a cast-iron beam, depends upon the size of the "cheese," or charge in the press, and the spacing between the strain rods; it being frequently desirable to have the space between the rods measured along the side of the press, less than across the front, as this gives the operator better access to the cheese.

Cast beams having a length greater than twice the breadth, measured from the centers of the rods, are usually treated as an ordinary simple beam, supported at each end and uniformly loaded over a portion of the length, as shown in Fig. 7. The value of the required modulus of section at the center may be found by substituting in formula (2). After finding, by trial, the dimensions for a section having the desired modulus, the contour of the top is laid out for appearance and a few other sections checked for stress, the bending moment at any section being found by the method used in deriving formula (1).

Fig. 9 shows a cast-iron beam of the rib type, which is extensively used on large presses. The stresses vary considerably, depending upon the spacing of the ribs and the manner of loading; but in any case where the center of pressure of the load coincides with the intersection of the diagonals drawn through the centers of the strain rods, the reactions at the points F, G, H and I are each equal to $W/4$, where W is the total load on the beam. Hence, such a beam is nothing more than a flat, rectangular, ribbed plate, supported at its corners and uniformly loaded over a given area that is concentric with the center.

In some instances, where only one or a few castings are needed, it is cheaper to make the beam of a flat plate without ribs. In this case the beam is a rectangular plate, supported at its corners and uniformly loaded over a length l' and breadth b'. The metal at the center of such a beam must resist the bending moments

$$M_1 = \frac{W}{2} \times \frac{L}{2} - \frac{W}{2} \times \frac{l}{4} = \frac{W}{4}\left(L - \frac{l}{2}\right)$$

and

$$M_2 = \frac{W}{2} \times \frac{B}{2} - \frac{W}{2} \times \frac{b}{4} = \frac{W}{4}\left(B - \frac{b}{2}\right),$$

which produce stresses

$$S_1 = \frac{W}{4}\left(L - \frac{l}{2}\right) \times \frac{6}{BT^2}$$

and

$$S_2 = \frac{W}{4}\left(B - \frac{b}{2}\right) \times \frac{6}{LT^2},$$

T is the thickness of metal.

Since these stresses act at right angles, their resultant is

$$S = \sqrt{S_1^2 + S_2^2} = \frac{3}{2}\frac{W}{T^2}\sqrt{\left(\frac{L - \frac{l}{2}}{B}\right)^2 + \left(\frac{B - \frac{l}{2}}{L}\right)^2}$$

If the load is distributed over the entire area of the bottom of the beam, $b' = B$, $l' = L$, and

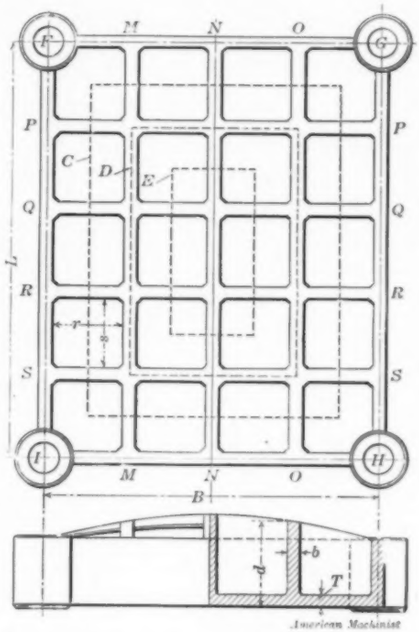

Fig. 9. Cast-iron Beam of Rib Type for Use on Large Presses

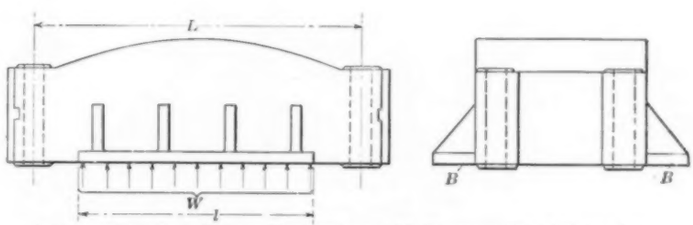

Fig. 7. Cast Iron Beam of Box Type with Pressure Head Extension.

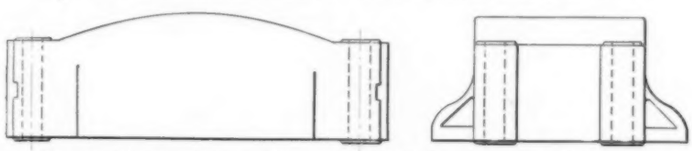

Fig. 8. Cast Iron Beam of Box Type with Pressure Head Extension.

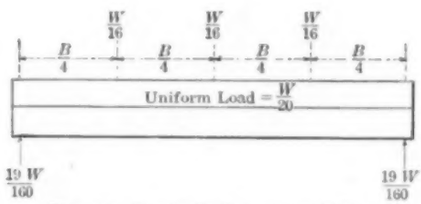

Fig. 10. Loads Acting on the Ribs *F-G* and *H-I*, Fig. 9, Case I.

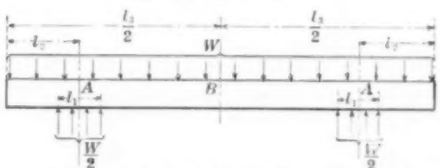

Fig. 11. Loads Acting on Pressure Head.

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Box-type Beams and Load Distributions

$$S=\frac{3}{4}\frac{W}{BLT^2}\sqrt{B^4+L^4}.$$

This formula may be used for flat beams, but to the writer's knowledge there is no similar formula applicable to the ribbed beam shown in Fig. 9.

An approximate solution given by Marks for the design of a ribbed beam, assumes it to be a grating consisting of two sets of small rectangular beams, each set carrying half of the load. It is possible to analyze a ribbed beam for a perfectly general case by denoting the numbers of ribs by N and n; but many of the formulas occur in the form of a series and are somewhat complicated.

To show the application of this method, a beam six ribs long and five ribs wide has been chosen, and the four typical manners of loading that are to be investigated are as follows:

Case I, load distributed over the entire area $FGHI$.

Case II, load distributed over the area bounded by C.

Case III, load distributed over the area bounded by D.

Case IV, load distributed over the area bounded by E.

CASE I.

The respective uniform loads carried by the ribs FI, MM, NN, OO and GH are equal to

$$\frac{W}{16}+\frac{W}{8}+\frac{W}{8}+\frac{W}{8}+\frac{W}{16}=\frac{W}{2}.$$

The respective uniform loads carried by the ribs FG, PP, QQ, RR, SS and IH are

$$\frac{W}{20}+\frac{W}{10}+\frac{W}{10}+\frac{W}{10}+\frac{W}{10}+\frac{W}{20}=\frac{W}{2}.$$

The outside ribs also take the reactions of those they support; hence, the total load on FG or HI is the uniform load $W/20$ and the three concentrated loads of $W/16$ each. Similarly, the total load on FI or GH is

$$\frac{W}{16}+\frac{4}{20}W.$$

The bending moments on the various ribs are as follows:

The distribution of the load on FG or HI is shown in Fig. 10 and the maximum bending moment is

$$M=\frac{19}{160}W\times\frac{B}{2}-\left(\frac{W}{16}\times\frac{B}{4}+\frac{W}{40}\times\frac{B}{4}\right)=\frac{3}{80}WB.$$

The maximum bending moment on FI or GH is similarly found equal to

$$M=\frac{21}{160}W\times\frac{L}{2}-\left(\frac{W}{20}\times\frac{3L}{10}+\frac{W}{20}\times\frac{L}{10}+\frac{W}{32}\times\frac{L}{4}\right)=\frac{121}{3200}WL.$$

The bending moments on MM, NN and OO are equal to

$$M=\frac{W}{16}\times\frac{L}{4}=\frac{WL}{64};$$

and for PP, QQ, RR and SS

$$M=\frac{W}{20}\times\frac{B}{4}=\frac{WB}{80}.$$

The size of the ribs for this particular beam may be found by substituting the value of the bending moments in the formula

$$M=\frac{SI}{c}=\frac{Sbd^2}{6},$$

or

$$b=\frac{6M}{Sd^2},$$

which reduces to the following expressions:

For FG,

$$b=\frac{3}{80}\frac{WB}{Sd^2}\times\frac{6}{Sd^2}=\frac{9}{40}\frac{WB}{Sd^2};$$

for FI,

$$b=\frac{121}{3200}\frac{WL}{Sd^2}\times\frac{6}{Sd^2}=\frac{363}{1600}\frac{WL}{Sd^2};$$

for MM,

$$b=\frac{WL}{64}\times\frac{6}{Sd^2}=\frac{3}{32}\frac{WL}{Sd^2};$$

and for PP,

$$b=\frac{WB}{80}\times\frac{6}{Sd^2}=\frac{3}{40}\frac{WB}{Sd^2}.$$

A satisfactory value is assumed for d and the breadth of the various ribs determined.

CASE II

In this case the loads and bending moments on the various ribs are as follows:

Loads on

$$MM,\ NN,\ OO=\frac{W}{6};$$

$$PP,\ QQ,\ RR,\ SS=\frac{W}{8};$$

$$FG,\ HI=\frac{W}{12}+\frac{W}{12}+\frac{W}{12}=\frac{W}{4};$$

$$FI,\ GH=\frac{W}{16}+\frac{W}{16}+\frac{W}{16}+\frac{W}{16}=\frac{W}{4}.$$

Bending moments on

$$MM,\ NN,\ OO=\frac{W}{12}\times\frac{L}{2}-\frac{W}{12}\times\frac{2L}{10}=\frac{WL}{40};$$

$$PP,\ QQ,\ RR,\ SS=\frac{W}{16}\times\frac{B}{2}-\frac{W}{16}\times\frac{3B}{16}=\frac{5}{256}WB;$$

$$FG,\ HI=\frac{W}{8}\times\frac{B}{2}-\frac{W}{12}\times\frac{B}{4}=\frac{1}{24}WB;$$

$$FI,\ GH,=\frac{W}{8}\times\frac{L}{2}-\left(\frac{W}{16}\times\frac{3L}{10}+\frac{W}{16}\times\frac{L}{10}\right)=\frac{3}{80}WL.$$

By substituting the values of the bending moments in the fundamental formula, the size of the ribs may be found.

CASE III

In this case the loads and bending moments on the ribs are as follows:

Loads on

$$MM,\ OO=\frac{W}{8};$$

$$NN=\frac{W}{4};$$

$$PP,\ SS=\frac{W}{12};$$

$$QQ,\ RR=\frac{W}{6};$$

$$FG,\ HI=\frac{W}{16}+\frac{W}{8}+\frac{W}{16}=\frac{W}{4};$$

$$FI,\ GH=\frac{W}{24}+\frac{W}{12}+\frac{W}{12}+\frac{W}{24}=\frac{W}{4}.$$

Bending moments on

$$MM,\ OO=\frac{W}{16}\times\frac{L}{2}-\frac{W}{16}\times\frac{15L}{100}=\frac{7}{320}WL;$$

$$NN=\frac{W}{8}\times\frac{L}{2}-\frac{W}{8}\times\frac{15L}{100}=\frac{7}{160}WL;$$

$$PP,\ SS=\frac{W}{24}\times\frac{B}{2}-\frac{W}{24}\times\frac{B}{8}=\frac{WB}{64};$$

$$QQ,\ RR=\frac{W}{12}\times\frac{B}{2}-\frac{W}{12}\times\frac{B}{8}=\frac{WB}{32};$$

$$FG,\ HI=\frac{W}{8}\times\frac{B}{2}-\frac{W}{16}\times\frac{B}{4}=\frac{3}{64}WB;$$

$$FI,\ GH=\frac{W}{8}\times\frac{L}{2}-\left(\frac{W}{24}\times\frac{3L}{10}+\frac{W}{12}\times\frac{L}{10}\right)=\frac{1}{24}WL.$$

According to this method of analysis, the ribs MM, OO, PP and SS are free from stress. NN carries a load equal to $W/2$, and the loads on QQ and RR are $W/4$, each.

The bending moments on

$$NN=\frac{WL}{10};$$

$$QQ,\ RR=\frac{W}{8}\times\frac{B}{2}-\frac{W}{8}\times\frac{B}{16}=\frac{7}{128}WB;$$

$$FG,\ HI=\frac{WB}{16};$$

$$FI,\ GH=\frac{WL}{20}.$$

After the dimensions of the ribs have been determined, the thickness of the bottom between the ribs may be found by the formula for flat plates fixed at the edges, given in 1903 edition of Unwin's "Machine Design":

$$T=sr^2\sqrt{\frac{P}{2S(r^4+s^4)}}.$$

where P is the pressure per square inch on the bottom, and r and s the distances between the ribs, as shown in Fig. 9.

The 1909 edition of Unwin does not refer specifically to "fixed" plates, but gives the general formula:

$$T=sr\sqrt{\frac{KP}{2S(s^2+r^2)}}.$$

The value of K varies from 0.75 to 1.13, the lower value probably being more suitable for a plate with fixed edges, such as each section here considered would be.

This frequently will give a value for the thickness of the bottom that is less than the breadth of the ribs, and in such cases T is made equal to b.

The insertion of the flat plates between the ribs to form the bottom will, of course, add to the strength of the beam and, in some cases, allow the depth to be reduced; but the writer prefers to use

from 6000 to 7000 pounds per square inch working stress for cast iron in the above formulas and neglect the thickness of the bottom.

Pressure Heads and Extensions

The beams shown in Figs. 1, 2 and 3 are usually provided with a pressure head *A*, made of wood or structural steel. In making calculations for the thickness, the head is considered as a beam loaded as shown in Fig. 11. In this case, the maximum stress may occur near *A* or at *B*, depending upon the values of l_1, l_2 and l_3, and it is necessary to compute the bending moments at both of these sections in order to find where the maximum stress occurs. The bending moment at *B* is equal to

$$M = \frac{W}{2}\left(\frac{l_3}{2} - l_2\right) - \frac{W}{2} \times \frac{l_3}{4} = \frac{W}{2}\left(\frac{l_3}{4} - l_2\right);$$

and at *A*, is approximately equal to

$$M = \frac{W}{4} \times \frac{l_1}{4} - \frac{W}{l_3} \times l_2 \times \frac{l_2}{2} = \frac{W}{2}\left(\frac{l_1}{8} - \frac{l_2^2}{l_3}\right).$$

Since the beam bends in the reverse direction at *A*, the value of *M* should be negative.

The extensions shown at *B B* in Fig. 7 are considered as uniformly loaded cantilever beams. The rib bracing shown in Fig. 7 is not in harmony with the general outline of the beam, although it is extensively used because it is less expensive than the construction shown in Fig. 8. A much better appearance is obtained in the design shown in Fig. 8, the core holes being closed at the ends by thin plates.

Working Stresses

The following allowable working stresses in pounds per square inch give satisfaction in the design of beams: Oak 800 to 900, yellow pine 900 to 1000, cast iron 5000 to 7000, structural steel 10,000 to 16,000. The shearing stress on the rivets shown in Fig. 3 should be about 6000 or 8000 pounds per square inch. All dimensions in formulas given are in inches.

Securing Safe Steel Forgings

By C. U. Scott

Some of the conditions necessary to secure strength in forgings that will conform uniformly with the quality of steel used.

It is just as necessary for a piece of steel to be heat treated as it is for high-speed steel to be hardened when it is shipped in the unannealed state as was the custom in the earlier days of this steel. If we remember, high-speed steel was invariably sent from the mill just as it came from the roll and used in this state in many instances. But we at length discovered that to heat treat this steel was to greatly increase its cutting powers. As a result, we now find most every shop heat treating their high-speed steel. If we are to receive the worth of our money when we buy steel of any kind we must heat treat it.

The Reason

We only have to turn to our testing department to see that something is wrong with its physical qualities. Here we may find that the steel showed much better in the original bar (annealed) than it does in the finished forging (annealed). Why is this? We are not permitting ourselves to use what light we have. It is time for us to awake to the fact that to forge steel should mean its improvement. When this is not the case, it needs heat treatment. It will be well for the manufacturer to look well in this line as the time is not far off when we will be forced to the proper treatment of every forging that enters into the mechanism of the locomotive, the rails, the automobile or the handcar.

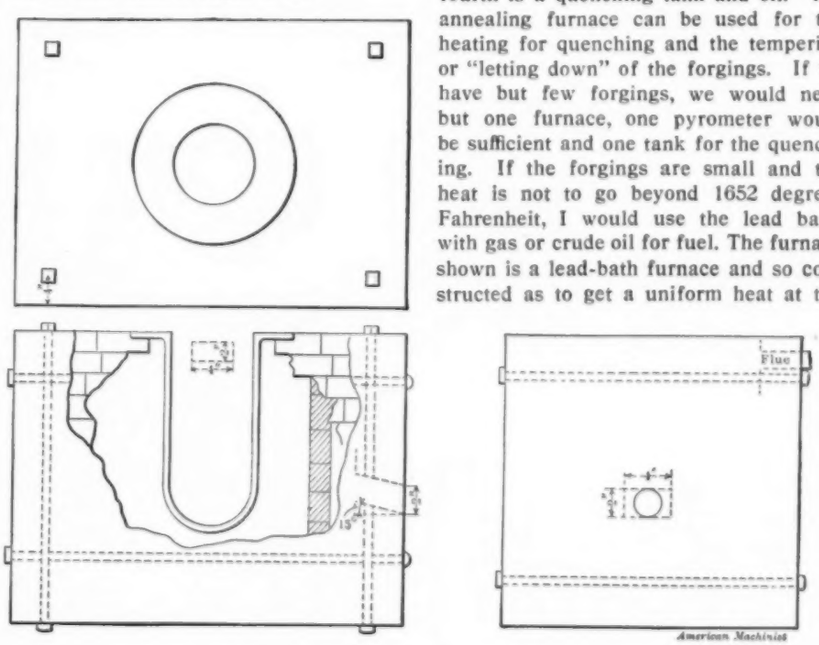
I am convinced that there are but few who realize the possibilities that lie in the proper treatment of steel. I am also convinced that there are but few who would term me a crank when I say that it ought to be made a criminal offense to manufacture any part of a machine or car from steel forgings untreated, that is intended for passengers if they but knew that it would prevent the rail from breaking, or at least tell us precisely what the condition of the steel was. As it is, we know the outside measurements of the steel and that is positively all we know.

In order to prove this we have only to turn to our testing department and look at our records and we will see that some of the forgings have nearly twice the elastic limit of others, while some will come within 10 or 20 tons of equaling the original bar with one-half of the elongation and the reduction in area is not anywhere near what it ought to be.

There are but few steels that cannot be put in the best possible condition by the proper heat treatment. There are but few receiving it. Is it that we do not take the time? Or is it that we are not awake to the possibilities of having a reliable forging? To me it presents a state of where those in authority do not fully understand the term "heat treat" and think that it is an invention of the steel man or money-making proposition of some kind. And yet it is so simple when compared to the ordinary problems of the machine shop that there is no room for comparison. Let us see what would be required in order to heat-treat steel.

The Four Requirements

The first thing is a proper method of annealing; the second is a correct method of heating for quenching; the third is a pyrometer to gage the heats and the fourth is a quenching tank and oil. The annealing furnace can be used for the heating for quenching and the tempering or "letting down" of the forgings. If we have but few forgings, we would need but one furnace, one pyrometer would be sufficient and one tank for the quenching. If the forgings are small and the heat is not to go beyond 1652 degrees Fahrenheit, I would use the lead bath, with gas or crude oil for fuel. The furnace shown is a lead-bath furnace and so constructed as to get a uniform heat at the



Crude-oil Fuel Lead-bath Furnace

same time the cast-iron pot is protected from the blaze and will stand continuous heating from 60 to 75 days except where the heat is run above 1652 degrees Fahrenheit. The high heat will shorten the life of the pot (where the heat is to be from 1650 to 1750 degrees Fahrenheit steam.

This furnace can be built without the making of a single pattern except for the pot. It will require 375 fire and 275 common brick for the furnace. The flue should be made of firebrick to a point ten feet from the furnace. The corner pieces can be made of angle iron, the stay bolts should be of ¾-inch rod and if possible the sides should be protected by sheet iron of ⅛ inch in thickness. The top and bottom should be made of ¼-inch iron, thus making the furnace so it can be moved at any time that it is desired. The side walls should be 9 inches thick, building up the walls and tapering them inside well up to the top, leaving the opening large enough to permit the pot to be removed after it has grown up to 1½ inches in diameter from the continuous heating. The flange on the pot should be of sufficient width to permit its weight resting well out to the side walls.

Use Care in Lighting

The lighting of this furnace is one of the very interesting things and it will be well for the operator to go slow and remember that there is always a possibility of getting too near the fire and to get burnt. However, with any care the furnace can be lighted as readily as the ordinary gas range. After the furnace has become warm it will then generate gas if the oil is properly atomized. This furnace is designed for high-pressure air or

If there is considerable work to be done, the tank will require sufficient oil to permit the proper quenching of the work.

If the work is long and slender it must be dipped from the end. If it is large, the oil must be agitated. Air is probably the best for agitating the oil but there must be a false bottom in the tank so as to prevent the work from going to the bottom, as considerable water will be carried in with the air and must be removed at intervals. This can be done by placing an oil pump in the tank and pumping the water from the bottom.

The drawing of the work after it has been quenched can also be done in the same furnace.

In order to heat treat it is necessary to anneal. The best way to anneal is in the lead bath. Have a few lugs cast on the sides of the pot so as to fasten the work down as it will float when placed in the lead. It will only be necessary to run the heat until the pyrometer has reached the desired heat for the annealing which should not be less than 1472 degrees Fahrenheit. It is well to remember that 1472 degrees in the annealing, especially of steel that has been heated as high as is the ordinary forging, is not far from being the correct heat for any forged piece of steel.

We must allow the work to cool down to 1200 degrees or more. If the lead has become solidified as is best thus insuring the work having cooled slowly. Or if the work is left in over night it can be removed as the heat is raised for the work of the next day. As lead melts at 620, there is plenty of time for removing the work before it reaches a heat that would interfere with the annealing.

Only One Anneal Necessary

The annealing can be done before any machining is done on the work, although we are usually advised to anneal after the work has been finished to within ⅛ inch or so of the finished size. I do not see any good reason for this and I have long been convinced that the thing to do was to anneal *once* and do that in a way that leaves no doubt as to what had been done when the job was finished. We often think that by annealing at as low a heat as possible we are benefiting the steel. That is a mistake as far as the work is concerned that comes from the forge shop. The proper heat for annealing for testing is from 18 to 25 degrees Fahrenheit above the calescence point. But this is not the case when we are annealing forgings or any other steel that has been heated without regard to the calescence point. This gives us the proper point for the annealing heat only for a bar of steel that is in perfect condition and has no bearing on the bar of steel that has been overheated as is the case with the forgings of today.

If we wish to observe the critical point in steel we must then do our forging at a heat that will benefit the steel rather than do it injury. It is a waste of time and money to buy pyrometers for determining this point and then allow our steel to be forged at any heat that we happen to get. Unless the forgings show a better physical test than the original bar of steel, there has been too much heat in the forging. If we are to correct this we must select some of the pieces that have had the highest heat and anneal them at a heat that will restore the piece to the best possible condition. It is not best to get the annealing heat too high, so that it is better to gradually increase it until the heat has been found that will give the best and most uniform results. My experience has been that 1472 degrees is about as low a heat as should be used in annealing forgings. I have found the critical point in steel of a very low (0.28 to 0.50 per cent.) carbon to run from 1272 to 1320 degrees and again I have found steel of high carbon (1.50 per cent.) to run from 1274 to 1310 degrees and if we are to judge anything from what science has found, we must heat our steel in a sane manner or work it sufficiently to restore it to its original condition after it has been brought to the high heat of forging. We must learn that every heat taken on a piece of steel must be done with the view of making it better. It is now possible to do forging, heat treating and hardening in an intelligent manner.

Securing Uniformity

Just think of the work that is done in the machine shop to insure uniformity, think of the tools that these men have, think of the tools that are kept by the manufacturer in order that his men can be accurate in their work on a piece of steel that the man has got a good price for having turned out a uniform product that is correctly treated.

Then think of a piece of steel having gone to the forge shop here to be forged at a heat that will reduce its physical qualities from 10 to 30 per cent. The doing of correct work in one department where the size only is considered is not going to make our product all that is desired. We cannot disregard the one thing that will insure safety to life of man and machinery.

Let us buy fair steel, give our forgings a heat that will be for the betterment of the steel and thereby produce a good article. We will then find that the steel-treating department can be relied upon to furnish forgings up to the full strength of the steel with as much accuracy as the machine shop does its work. We may then know the strength of a forging by knowing its composition, heat treatment, and measurement, instead of knowing only its measurement.

In a preliminary report made by the Bureau of Census it is pointed out that the automobile industry has been consistently developed in those States in which the carriage and wagon industry was of great importance. The number of automobiles manufactured increased from 3723 in 1899 to 127,289 in 1909, or 3319 per cent. Of these, 126,570 were built in establishments of which automobiles were the main product. A table prepared shows that in 1909, Michigan had 43 plants engaged in the automobile industry producing products valued at $80,330,000, included in which were 64,921 automobiles valued at $70,519,600; Ohio had 29 plants producing $29,659,800 in value, of which there were 14,439 automobiles valued at $23,724,700; Indiana had 46 plants turning out $21,817,600 worth of products, of which $17,728,500 represented 17,484 automobiles; New York produced $20,996,700 total in 34 plants, of which $17,638,100 represented 8108 automobiles. For the same year all other States in 164 plants produced $41,918,500, total value of which $35,504,200 represented 22,337 motor cars.

Making Sheet Metal Lamp Parts

By Ethan Viall*

Forming gas-burner tops, trimming the ends, rolling the ridges, perforating and clinching in the mantle-wire supports.

The punches and dies used in forming mantle wire sockets.

Forming an oil-can spout.

Punch press and indexing mechanism used for finishing lamp skirts.

The evolution of a common burner top, such as used on a majority of incandescent gas burners to support the mantle, is an interesting process from the time it is blanked out from a strip, as a flat metal disk to the time it is ready for shipment.

The Arlington Stamping Company, Arlington, N. J., manufactures immense quantities of these burner tops, as well as many other lamp and sheet-metal specialities, and it is to the courtesy of their general manager, Everett D. Holley, that we are enabled to show our readers a few of the features of their work, and a share of our thanks is also due to D. S. Holley, the superintendent.

Several burner and other parts are illustrated in Fig. 1 and, as far as needed, the various steps in their manufacture are shown. A burner top is first blanked out and then drawn down into a cup as at *A*, then it is given a second drawing leaving it as at *B*. This finishes the drawing of the cup from which the tops are made and the next step is placing the cups on the mandrel of the machine shown in Fig. 2, and shearing them to length. Now they are sent to the rolls, Fig. 3, and the ridges rolled in, leaving them as at *C* and *D*, respectively. From the rolls they go to a punch press and have the bottoms punched out, as shown at *E*.

*Associate editor.

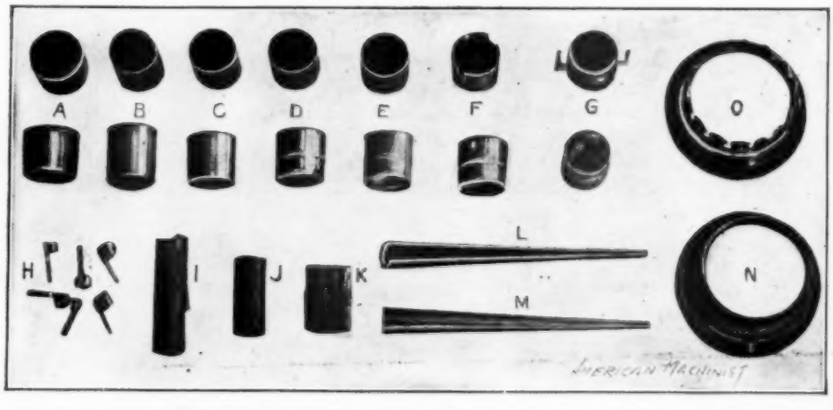


FIG. 1. STEPS IN THE EVOLUTION OF A BURNER TOP AND OTHER SHEET-METAL PARTS

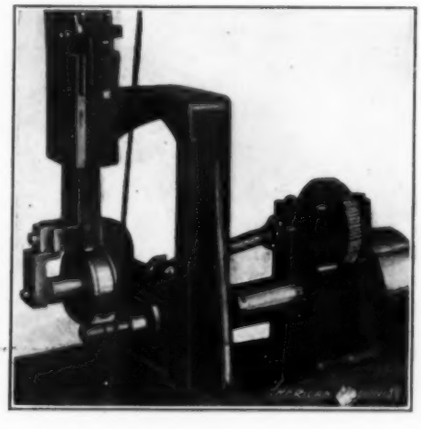


FIG. 2. MACHINE FOR TRIMMING THE OPEN END OF BURNER TOPS

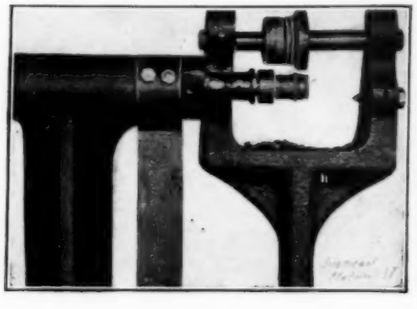


FIG. 3. MACHINE FOR ROLLING THE RIDGES IN BURNER TOPS

FIG. 4. PUNCH PRESS AND DIE USED FOR PUNCHING THE SIDE HOLES IN BURNER TOPS

FIG. 5. DIE USED FOR CHUCKING WIRE SOCKETS INTO BURNER TOPS

A Novel Perforating Machine

The small holes in the sides, shown at *F*, are punched out in a special machine, Fig. 4, the photograph of which was taken looking down on it from the top of the bench on which it was bolted. In this halftone, *A* is the driving pulley to the shaft of which is attached a crank operating the connecting rod *B* which, when in motion, gives a reciprocating movement to the cam disk *C*. The punches are set into slots and have rollers *D D D D D D* on their ends. A blank from the pile *E* is dropped over the "die" *F*, and as soon as punched it is thrown in the lot G. The action of the punches is continuous and the girl operator drops a blank on with one hand and removes it with the other, with the regularity of clockwork, there being no danger of cut fingers with the construction shown. The

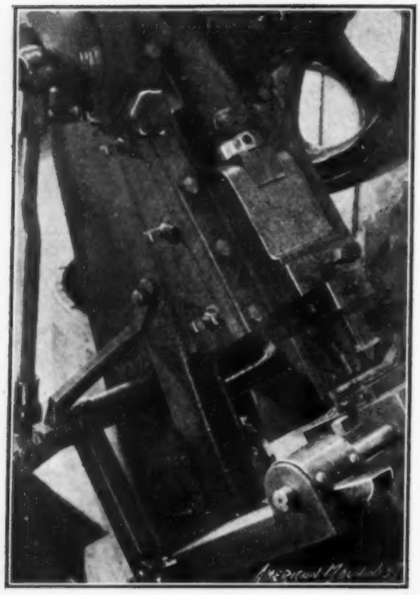


FIG. 6. PUNCH PRESS, PUNCHES AND DIES FOR MAKING WIRE SOCKETS

clinched into place, as shown at *G*, Fig. 1, a number of the pressed-metal sockets being shown at *H* of the same figure. This is done by slipping the "claws" of the sockets through the perforations in the burner tops by hand, as at *A*, Fig. 5. The top is then dropped over the center piece *B*, of the die, and the press tripped, which causes the parts *C C* to descend and press against the rollers *D D*, forcing in the slides carrying the punches *E E* and clinching the claws of the wire sockets firmly on the inside of the burner top.

The wire sockets just mentioned are blanked and completely formed in the press and dies shown in Fig. 6, and in Fig. 7 is given a view of the punches and dies from the right-hand side of the press as one stands facing it, while Fig. 8 is a view of the dies from the rear with a socket in place ready for the last operation, which is that of closing the edges for the tube into which the mantle wire is placed.

The parts *I*, *J* and *K* in the first half-

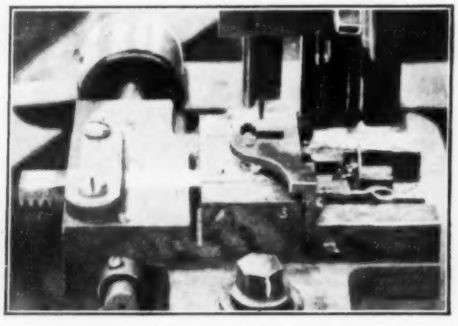


FIG. 7. RIGHT-HAND VIEW OF WIRE-SOCKET PUNCHES AND DIES

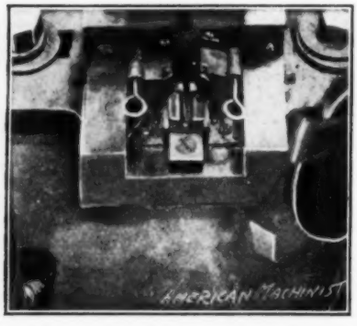


FIG. 8. REAR VIEW OF WIRE-SOCKET DIES

screws and washers at *H H* are merely retainers for the cam plate.

A CLINCHING PUNCH AND DIE

After leaving the perforating machine just shown, the wire screens are pressed in, and then the sockets, used for holding the wire mantle supports, are

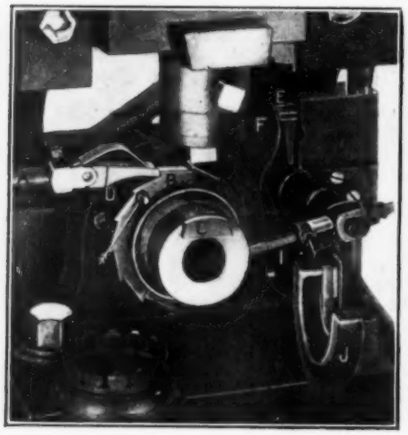


FIG. 11. ENLARGED VIEW, SHOWING DETAILS OF LAMP-SKIRT DIE

tone show the steps taken in the formation of an oil-lamp wick tube, no details of which will be given in this article.

FORMING OIL-CAN SPOUTS

In Fig. 3 are the punches and die used to form the oil-can spouts, illustrated at *L* and *M*, Fig. 1. The blanks for the

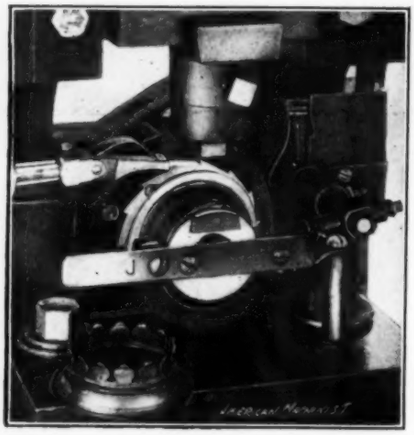


FIG. 12. VIEW OF SKIRT DIE WITH BLANK IN PLACE

spouts are first cut in a large shear, which wastes no stock, then the blank is first formed in the die *A*, with the punch *B*, the result being a piece like *C*. Next using the same die, the piece is closed with the punch *D*, after which the spout

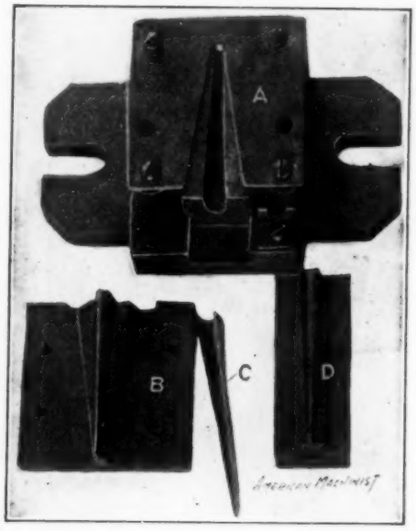


FIG. 9. FORMING PUNCHES AND DIE FOR OIL-CAN SPOUTS

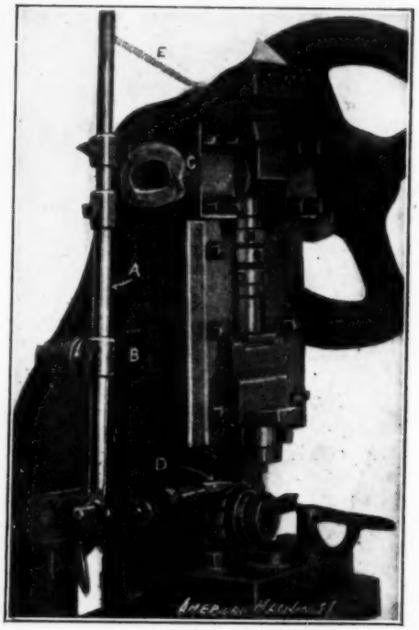


FIG. 10. PUNCH PRESS AND INDEXING DIE USED FOR LAMP SKIRTS

is placed in the screw top and the joint soldered.

PUNCHING RETAINING FINGERS ON LAMP SKIRTS

Lamp skirts or chimney retainers are first drawn to form in the punch press and then the retaining fingers are cut out in the press shown in Fig. 10. The mechanism of the indexing die used is operated by the rod *A*, which rocks on

the bracket *B*, being given its motion by the cam *C* on the end of the crank shaft, the lower end of the rod being connected with the dog *D*, which works the ratchet wheel on the die. The rod finger is held in contact with the cam by the spring *E*.

Details of the Indexing Mechanism

Details of the indexing die are given in Figs. 11 and 12. In Fig. 11, *A* is the indexing dog, operated by the rocking arm; *B* is the revolving ratchet or indexing wheel which carries the lamp skirt; *C* is the die which is set into a stationary sleeve around which the ratchet wheel revolves. This wheel is held tightly against the rear angle of the bed plate by friction collars and is kept from a retrograde movement by the spring *D*.

Only one tripping of the press treadle is needed to automatically finish the skirt, for a notch is cut in the clutch rod so that as it rises when the treadle is pressed, the pin *E* is forced forward into the notch by the spring *F*. This keeps the clutch rod *G* up and the press ram working until the pin *H* makes the circuit and comes in contact with the lever *I*, which it depresses, pulling out the pin,

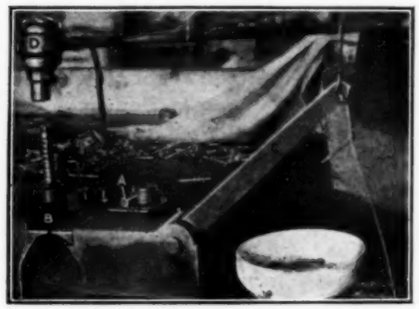


Fig. 13. Device for Riveting "Buttons" on Oil Burners

letting the rod *G* drop down and releasing the clutch.

Fig. 12 shows the parts in the same relative position as the previous figure, except that a skirt blank has been put on and the retainer lever *J* swung into place. In both views a finished skirt is shown in the lower left-hand corner. By examining the lamp skirth shown at *O* and *N*, Fig. 1, a slot will be observed at the bottom of the rims. This slot fits over a pin on the indexing wheel, not shown, and keeps the skirt from slipping during the punching operation.

Riveting on Buttons

Fig. 13 shows the device used to rivet the buttons or thumb pieces onto the ends of the little shafts used to turn the wick-feeding wheels of oil burners. One of the buttons riveted on is shown at *A*. In using the device, the shaft is first put into the burner, then the end is placed between the vise jaws *B* and the lever *C*, depressed by means of a foot lever to which it is connected by a wire; then a button is placed on the end of the shaft and a blow given the upsetting punch by striking it with the hammer *D*, which is held up by a coil spring at *E*, the blow, of course, being given by hand.

Fig. 14 shows the way the bottoms of umbrella stands or other circular pieces are soldered on, the work being placed on a small turntable, acid run around the joint and then the piece revolved as solder is applied with a small blow torch.

A Manager's View of the Taylor System

By James R. Johnson

I am a thorough believer in efficiency and good management, and do not wish to appear otherwise. But as no system fits all cases, my own experience may prevent others getting into a similar predicament—and they all cost money. I am pretty well convinced that to start the Taylor system in an old established shop, where piecework has already attained high efficiency, is a very large problem, and it is questionable whether any good results would be obtained. I believe, however, that in the starting of a new industry and the training of new men it might work out all right.

To give you a few of the facts of our own experience. We developed a set of special tools for lathe work, the work being done in large quantities. After careful experiment regarding the tools and when we had them "scientifically perfect," we attempted their introduction. The first men who used them pronounced them an entire success and talked so much about it that we built one hundred of them, and when they were ready we appointed a careful man to take them in charge and instruct the workmen in their use. There was an immediate falling off in the work, which we attributed to the men not being used to the new tools and which would be overcome very shortly. We insisted on the tools being used and new ones which had previously been ground up to our gages being obtained from the tool room. We fought the thing through for a year and at the end of that time gave it up. We could take new men in and train them up to get maximum results with these tools, but a great many of the older men could get just as good results in quantity and quality with their regular tools ground in their own way. In some cases they could get considerably more work for each grinding of the tools.

Is There One "Best Way?"

One of the things which defeated our tool was this: Its performance was based on a certain speed and feed and if this was maintained, good work and of a suitable quantity was the result. However, some men could not operate under these speeds—some wanted one-half of the peripheral speed with double the feed and they could get out their work to pass inspection and make money and could not do it under the other conditions. We lost quite a number of good men through our insisting on the tools being used. Very often we found a man spending several days using his best efforts to adopt the new tools, and when he found he was running behind and no one was looking, he would use his old tools to make up for lost time. Right across the aisle from him would be another man using the new tool and smilingly say he had no trouble whatever.

After a year's trial and paying the expenses of a man to fight it through, we

Fig. 14. Soldering Bottoms on Umbrella Stands

decided that if the men could take their tools and grind them themselves and get the work out satisfactorily and at our prices, we didn't think it would be worth while to eternally fight and run the risk of losing good men to carry out a plan which, while doubtless entirely logical, had more or less theory bound up with it. I realize fully that this to Mr. Taylor would probably sound like a very weak argument; also that he would tell me how he would do it. But when a man with good intelligence has been doing good lathe work for 10 years at prices at which the new man cannot make his salt, why fight eternally for a mere theory which does not increase production? It is a little different problem than tackling a big shop where everything has been done day work.

Exceptional Men

We have one grinding-machine operator who can easily do as much in three days as any other operator we have can

do in five days. He is exceptionally skilful and rapid—every movement that he makes counts. What would we be up against if we had this man set the pace, and establish our prices on what he can do? Counting this man's maximum efficiency as a standard would mean that every other man we hire for this work has got to come up to that standard or get out. In attempting to reach this standard with other men we have not found one man in five years who can come more than half way alongside of this one. This is a case where good common sense would have to go along with the application of the Taylor or any other system.

There is one other thing that enters into the introduction of system into shops that are fairly well managed. The cost of collecting the data and the prosecution of the scheme is often so great that it takes a pretty poorly managed shop to save enough to offset this. Some of the so called scientific managers spend $5000 in the office to save $1000 in the factory. When one of these experts once starts to collect information, it is remarkable how quickly he can surround himself with an army of clerks, and it is also remarkable how inaccurate these clerks get in their records in a very short time. Records are a grand thing if they are accurate and don't cost too much to get them.

Club House of United Machinery Company

The Country Club House of the United Shoe Machinery Athletic Association, was recently dedicated at Beverly, Mass. The building is very pleasing architecturally and more or less of an innovation sociologically. The evolution of the undertaking is interesting.

In the factories of the United Shoe Machinery Company, at Beverly, Mass., there are employed several thousand people. A number of years ago the employees on their own initiative organized an athletic association. The organization found the support and encouragement of the officers and directors of the corporation. The Company had never undertaken to develop what has come to be known as the "Model Community," but had always maintained the practice of working with the employees in any movement which will promote the general welfare. Early in the history of the association the officers of the company set apart a large area of land within the immediate vicinity of the factories to be devoted to athletic purposes—a playground. This athletic field is of great enough extent to permit of baseball, football, cricket, tennis, shooting, track athletics and all field sports. Near by are facilities for boating. The success of the association in its outdoor activities suggested the importance of sustained activities along similar lines during the winter months, and the indoor athletic question presented itself.

The officers of the corporation decided to erect a club house, convenient to the field, the factories, and the homes of many of the operatives.

From the club-house idea as originally conceived in the interests of athletics, the plans developed until they called for an institution which should conform to all of the requirements of an ideal Country Club House, socially as well as athletically. The company set aside another piece of land and upon it erected the handsome building which has just been dedicated. Upon the occasion of its dedication it was presented outright by the United Shoe Machinery Company to the United Shoe Machinery Athletic Association. In the speech of presentation, George W. Brown, vice-president of the company, referred to the gift as that of the officers of the company to "our associates." He dedicated it as "a home for play and goodfellowship."

The club house is a handsome structure of cement, and is fully equipped. In the basement are separate locker rooms, toilets and showers, for men and women, and four bowling alleys. On the main floor are lounging rooms, writing rooms, a library filled with reference books and fiction, a billiard hall with four tables, a card room, and a cloak room.

The second story is devoted to an assembly hall, with a stage for theatricals, and a seating capacity of 450. The building is lighted throughout with both electricity and gas. The house is open throughout both day and evening. Its privileges are available to every member of the association, and membership is pany at the nominal rate of $1 a year.

Fig. 1 shows the interior of one of the recreation rooms and gives an idea of the arrangement, style and finish. Fig. 2 shows the assembly hall. Here is an ample ceiling hight with a trussed roof; lighting from windows at the sides as well as from arcs overhead, and a floor of ample proportions for dancing and other amusement purposes.

FIG. 1. LIBRARY

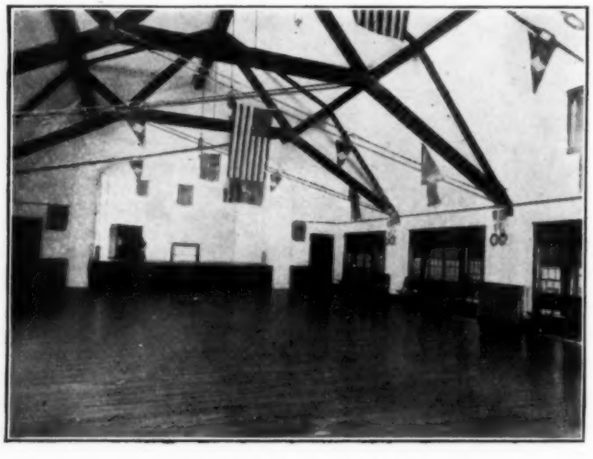


FIG. 2. ASSEMBLY HALL

Different Results Obtained from Lathe and Planer Tools

There are different theories as to why planer tools will not stand as high a cutting speed as lathe tools. But it all seems to come down to the ability of the tool to stand the shock of entering the work, the cutting strain and the heat generated.

A lathe tool has a continuous cut without shock and is usually kept cool by a large and constant supply of lubricant. A planer tool must stand the entering shock and is seldom cooled. In many cases the planer tool stands up better on "string" or intermittent work, because cooling off between pieces is more important in some cases than the effect of the shock on the tool point. With the tool kept cool, and a very long cut, there is no reason why a planer tool should not stand as high a speed as a lathe tool.

Letters from Practical Men

Concerning the details of making things in machine shops, from the first sketch to the shipping room. A letter good enough to print will be paid for. The value is in the idea—not the length of the letter

Writing for the Papers—A Tap and Die Holder

The question is often asked and answered: "Does it pay to write?" and it is interesting to note the different viewpoints taken by different people in regard to this query. A few figure on the price per yard they get for the work and decide that it doesn't pay to write. To a fairly busy man getting a good salary for his time, it is a money loss to put time into writing an ordinary magazine article. I often think of the horrible disappointment I received once, a few years ago. A subscription salesman for the AMERICAN MACHINIST was turned loose in the shop and managed to carry off a good bunch of orders. To sort of clinch the deal with me he drew a beautiful mind picture of the easy time I would have paying off the subscription, and above all, making money on the side: "Take and write up these special appliances and attachments you have here, make a rough sketch to illustrate and send them in. You can make a pile of money."

I lost no time in getting busy on the job. I won't say anything about the paper I used up, or the sarcastic remarks of my wife. Once I missed a few sheets which I had decided were about right and asked her if she had seen them.

"Was it a lot of stuff about automatic machines?" she asked.

"Yes," said I.

"Well, I was determined to prevent you making a fool of yourself, so I burnt them."

The blow almost killed father, so I did no more writing for a while. I got more satisfaction out of explaining to my better half the amount of real money she had burnt up. Since then I have written several articles which have been accepted by the editor, but the real benefit I get out of seeing something I have written in the AMERICAN MACHINIST is the satisfaction of knowing that I am not drifting hopelessly behind the times.

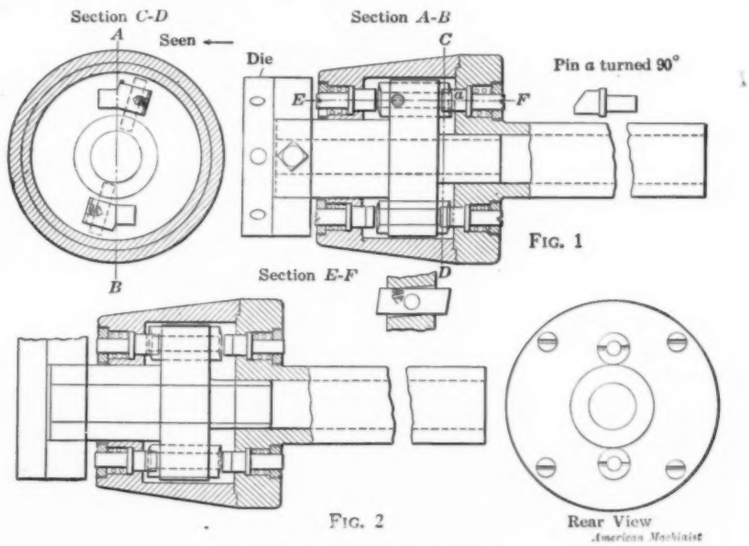


FIG. 1

FIG. 2

A TAP AND DIE HOLDER

The line cut shows a dieholder I found necessary to design at one time. We had long screws to make on a 3-hole Loewe automatic, and in order to get the guaranteed production we had to bring up the cutoff so as to commence to work the instant the spindle reversed to run the die off. With the ordinary die holder with solid pins this was impracticable, because on account of the turret returning slowly and the spindle revolving left hand at such a high speed, the corners were soon knocked off the pins and then things began to bump.

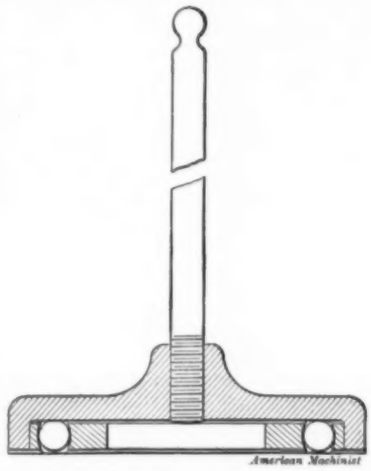
With this one there was absolutely no more trouble. The chief feature is the driving blocks. These have about 1/16-inch play and when not driving are held 1/16 inch above center by very light springs. The moment, however, that they come in contact with the pins, they are forced down, thus becoming slightly lengthened.

Fig. 1 shows the die starting on the cut and Fig. 2 shows the die when the turret is at the end of the stroke. The pins have automatically come away from contact with the driver blocks, allowing the springs to lift the blocks up, causing about 1/64-inch space so that the die holder can run perfectly free. The instant the die is off the pins, as at Fig. 2, the spindle reverses quite independently of the return cam. The die then returns the length it is on the front pins, giving room for the cutoff tool to come up and commence work. In the meantime the cam drawing back the turret has caught up, and almost invariably the piece is cut off very soon after the die has run off. You can plainly see that with the use of this die holder no great trouble is necessary in setting the threading cams; also the output is considerably increased on account of the possibility of quicker reversing, thus letting the cutoff commence sooner.

Friedenau, Germany. M. PLODMAN.

Ball Bearing Base for Scriber Blocks

On automobile work where the surfaces are generally very greasy and not always smooth, or in engineering work laid off from a surface plate, I find the block shown in the cut more convenient than the usual heavy-based one.



BALL-BEARING BASE FOR SCRIBER BLOCKS

An ordinary thrust ball retainer such as used in automobile work is pushed into the base just tight enough to prevent it falling out. It is not necessary for the balls to turn round to give an accurate setting. This gives at once a cheap and exceedingly useful scriber block.

Asnieres, France. H. WOOLLEN.

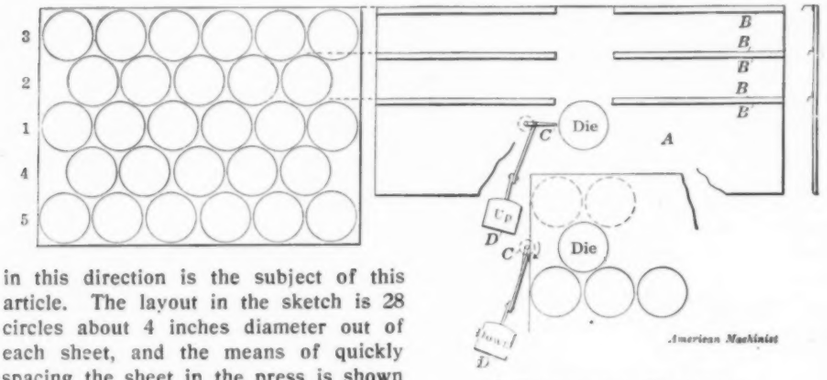
Economical Blanking

The greatest possible economy of material, when cutting circles out of square sheets, is secured by using a stagger layout and the largest sheets that can be conveniently handled. A successful effort in this direction is the subject of this article. The layout in the sketch is 28 circles about 4 inches diameter out of each sheet, and the means of quickly spacing the sheet in the press is shown beside the layout. A sheet of steel *A*, ⅛ inch thick and about twice the length of the layout, is fastened to the bed plate of the press, the top of the plate being about the same hight as the cutting edge of the die, which is located in an opening provided in the plate; gaging strips or guides *B* of angle iron, or sheet iron bent to the shape shown in the edge view, are fastened to the plate. These strips are of different hights, the lowest near the die and the highest farthest away. The stop gage *C* is arranged to swing in a circle through the action of a link and a bell crank on *D*, which serves as a sort of "pedal." The stop gage *C* is of such length that its point serves to gage the width of the bridge of metal between the circles, and is so located that the stem, when the point is rotated out of position, serves to correctly determine the position of the first circle in the second and fourth rows of the layout. This position is used only twice for a five-row layout and the "pedal" *D* is so located that it can be depressed by the operator's left wrist or forearm when the sheet is held in approximately the correct position without moving either hand or releasing the hold on the sheet. This position is shown, for the sake of clearness, in the cut with the pedal marked "down" and the sheet in place for the first cut only in the second or fourth row; all other circles are cut with the gage in its normal position, point toward the die, where it is kept by a light spring and no further attention is paid the pedal, only at the first cut in a staggered row. The rows are cut in the order shown in the layout, middle row first, in order to preserve the edges of the sheet stiff and true for service against the guides *B*. The sheet is easily turned over after the first three rows are cut and the last two presented in proper order. We use this stagger layout a good deal on single-action drawing and forming dies, where the work is ejected from the punch, in inclined presses, and this system of cutting the middle rows first, effectually prevents the articles from becoming entangled in the stock.

There is some advantage, especially with heavy stock, in hinging the guides *B*, nearest the die, at their outer ends, so the sheet is not bent or buckled over them when cutting the middle rows, but with light stock and guides as low as advisable no trouble will be encountered with solid guides. A spring- or cam-actuated stripper is provided on the punch which leaves a clear die space and gives the operator additional time to move and locate the sheet. For ejected work the guides are separated to provide a path.

The greatest production was secured with sheets of stock not exceeding 30 inches in length, the operators becoming more fatigued by the greater exertion required with larger sizes. Also, large sheets cost enough more per unit of surface to almost eat up the economy of layout in the additional surface.

Chicago, Ill. W. H. SIRIUS.



ECONOMICAL BLANKING

Keying a Pulley without a Key

Putting up some light line shafting and having a solid pulley to put on and not wishing to cut any keyways, I chucked the pulley in the lathe and bored to the required size. Then I threw it out of center one quarter of an inch and recessed it to within half an inch of each end. I placed a piece of quarter-inch round the length of the recess in it, slipped the pulley over the shaft, gave a sharp turn and it was keyed securely, easily and quickly and could almost as easily be taken off when wanted.

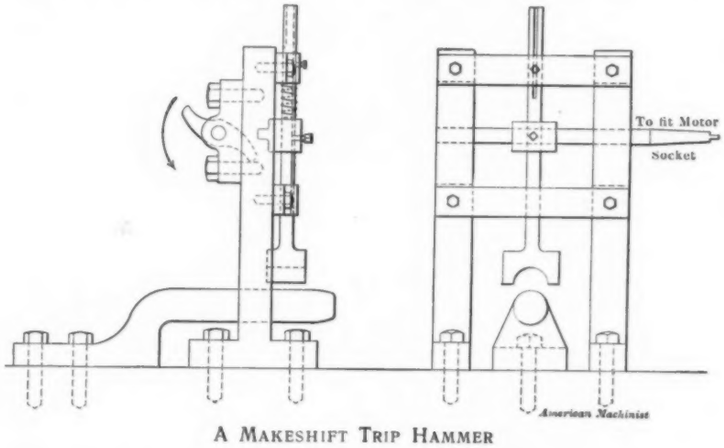
Passadena, Cal. J. E. J.

A Makeshift Trip Hammer

The accompanying illustration shows a trip hammer for welding flues. This hammer has been used very successfully, in the shops of the Mathieson Alkali Company, Saltville, Va., for welding a short piece on flues which have been shortened in removal. It is designed to be driven by a pneumatic drill motor as indicated in the cut. The base, to which the uprights and anvil are attached, can be made of any large flat piece of steel or iron.

It is evident that this hammer can be used for other light work, by merely substituting a suitable anvil and hammer face.

Blacksburg, Va. W. C. DIXON.



A MAKESHIFT TRIP HAMMER

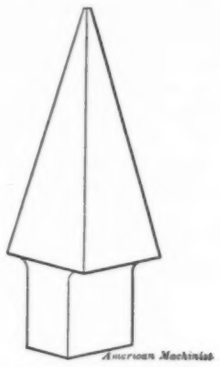
Enlarging the Bore of Emery Wheels

A certain large, wholesale hardware house often received orders for emery wheels of various sizes which they were unable to furnish because the bore was of an unusual dimension, the other dimensions being correct. To fill the order they would send the emery wheels to a small contract shop near by, in which I was employed, to have these holes enlarged.

Sometimes we would have to enlarge the emery part of the hole with a ham-

mer and chisel to make room for the lead bush, but this was a rude and slow method and one which was apt to break the smaller wheels. We finally adopted a device shown herewith, forged of tool steel and hardened. One end of this tool is held in a vise, and the emery wheel reamed, first from one side, then the other.

Of course, the tool did not cut or become dull, so to speak, but broke the emery up and enlarged the hole in one-tenth the time of the old way.



THE TOOL THAT DID THE WORK

Detroit, Mich. DANIEL MELROSE.

Punches and Dies for a Telephone Mouthpiece

The cuts show the punches and dies for drawing a shell that is a little out of the ordinary.

The shell is used as a mouthpiece on telephone work; it is made out of 3/32-inch brass and is drawn up the ordinary way as a straight shell with a flange until it reaches the first operation. The cut shows clearly, using a plain wing die and a punch chamfered off on the bottom leaving a flat at *A*. The idea is to get stock into the corner so as to form the side shell.

The second operation has a plain ring die, which reduces the diameter of the shell, the punch having a more pronounced bump than in the first operation draws the stock down and commences a corresponding bump on the shell.

The third operation is the principal operation. The die is made in two pieces necessarily in order to extract the shell after forming. The two halves are set in a shoe and when locked in position are almost equal to a solid die. The punch proper has a swinging portion, which on striking the bottom of the shell swings out to right angles, thus forming a tube by forcing the surplus metal into the side recess.

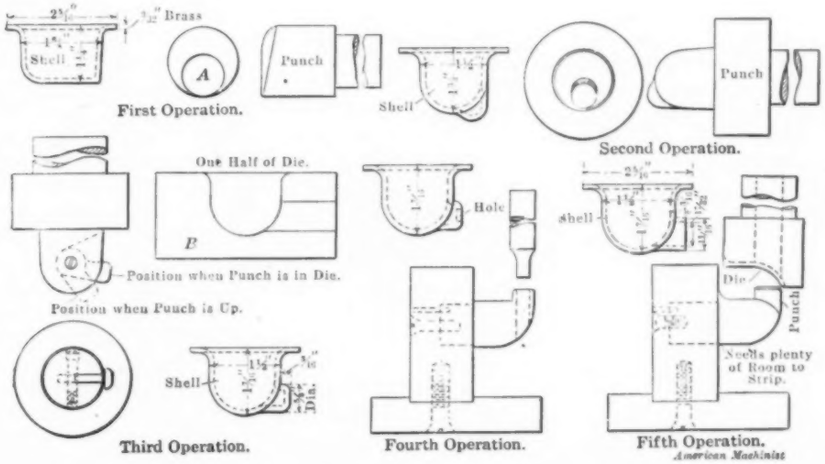
The sketch of the punch shows the swinging portion in both positions. As the punch ascends the swinging portion is pulled into the lower position.

The fourth operation consists in piercing a 9/32-inch hole in the end of the tube now formed.

The fifth and last operation consists in opening the 9/32-inch hole and drawing the tube up to the full size. The shell is placed on the punch or horn (The punch and die here is the reverse of the ordinary position) and the die descends, drawing the tube.

The shell now goes to the screw machine where the tube is faced and tapped and the flange trimmed to two inches diameter.

Springfield, Mass. J. T.



PUNCHES AND DIES FOR A TELEPHONE MOUTHPIECE

Spring Testing Device

The following describes an arrangement for testing compression springs which has been found very convenient in the inspection department of a large automobile-manufacturing concern.

The specifications for the springs usually call for a certain pressure between limits at a given hight and the springs are tested for these points only.

The arrangement consists of a No. 3 arbor press which gives a range for hight of 11 inches, and a Howe scale, the base of which was cut away to permit the ram of the press being set directly over the center of the scale platform. The upper beam of this scale is graduated to weigh up to ten pounds by ounces, and the lower one reads up to 40 pounds by half pounds; the total capacity is 240 pounds. An adjustable collar is provided on the ram to serve as a stop at which the readings are to be taken, and the ram is bored out to receive centering blocks for the different sized springs.

In testing, the weight is set at the required position, and the collar on the ram is set to give the required hight; the spring is placed in position and the ram is brought down as far as the collar will permit. This pressure should just raise the scale beam, but if it does not the index weight is shifted until the beam does balance, which gives the correct reading. The weight on the upper beam is used to balance the weight of the spring, no deduction then being necessary from the reading on the lower beam.

On valve springs, etc., which come in in barrel lots, very good time is made in inspecting; beating out an expensive testing machine three to one, and the accuracy is all that is required.

Cleveland, O. E. W. WEAVER.

More Draftsman's Kinks

In looking over my collection of odds and ends the other day there came to light two little articles which were made at different times, and which may be of use or interest to brother draftsmen.

Fig. 1 was made for drawing radial lines. I had a large number of gear-wheels to lay out; and had the device made to do away with a triangle and pin. The sides of the arm are radial with the center point and beveled to facilitate inking. A small knob allows the arm to be readily swung about at will.

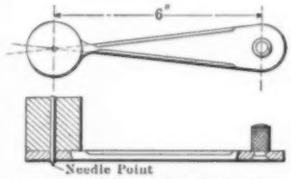


Fig. 1 Device for Ruling Radial Lines

Fig. 2 Thumbtack Straightener

American Machinist

MORE DRAFTSMAN'S KINKS

Fig. 2 represents a block used for straightening thumbtacks. One or two light blows with a hammer puts them in shape for service again.

Springfield, Mass. F. W. B.

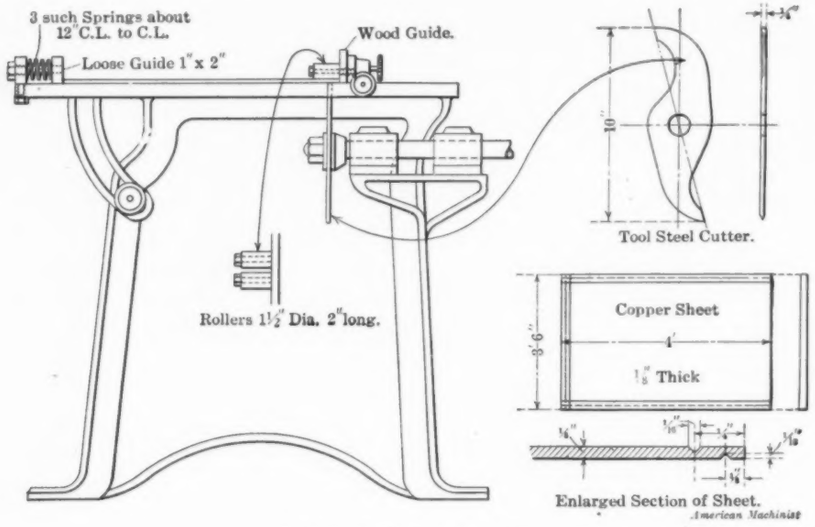
Grooving Copper Sheets

Having occasion to groove about eight thousand cold-rolled copper sheets as per the sketch, and after experimenting with planing and scraping with special tools, the rig shown was devised and worked very satisfactorily. As will be seen the machine is an ordinary rip saw or

routing machine used in the carpenter shop. The routing blade was machined and ground to shape as shown, backed off and placed on the arbor which could be adjusted for hight above the table or depth that the tool would cut, and a pan was placed under the tool which was kept filled with a drilling compound in which the tool ran continually. The rollers shown were used to keep the sheet down on the table and against the tool.

The work was done by two boys who used a gage to set the tool, and every fiftieth sheet was checked with a small gage for distance from the side and depth of groove.

Baltimore, Md. J. S. H.



GROOVING COPPER SHEETS

Mounting Abrasive Wheels

Fig. 1 shows an emery-wheel mount which is in general use here in the slide-rest grinder for the bench lathe. It consists of two brass flanges, and a steel arbor as shown. To prevent the rear flange from unscrewing when removing the wheel a drop of solder may be applied at the point indicated. The wheel is secured by placing it on the fixed flange while the other is screwed on as far as possible with the fingers, then grasping the wheel by its periphery and turning, for the fixed flange in Fig. 1 which is sweated into it. The arbor can now be placed in a taper chuck while the flange is faced and turned off. At this point the flanges may be clamped together for drilling the screw holes. All that is now necessary is to counterbore and tap the holes, and chamfer the movable flange as in Fig. 2, then turn the groove for the wheel seat which can be ground in by holding the wheel in the hands while the mount is revolving. I use this wheel for grinding thin slotting saws for clearance and thickness. The method of doing this consists of chucking a piece of brass and recessing it to a depth somewhat less than the thickness of the saw and a trifle larger than the diameter. The saws can then be inserted with the thumb while the lathe is running, and the engagement of the teeth in the recess is sufficient to drive them when the wheel is moved up to the work and withdrawn at intervals. A receptacle can be placed under the chuck to catch the saws as they drop out. Occasional measurement of the saws makes it easy to get the thickness required, while the clearance is obtained by swinging the slide rest.

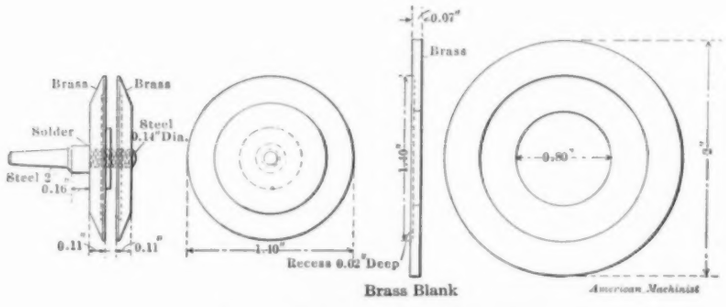


FIG. 1. ABRASIVE WHEEL MOUNT

The following was copied from the tag on the abrasive wheel.

Size 4x¾x1¼

Grade E

No. of Corundum 90 [Craig Mine Crystal]

No. of Revolutions 4775.

If no other means are at hand to determine the speed at which the wheel should run, a simple way is to place a finger close to the lathe belt, and count the impulses of the joint in its revolutions for one minute. Next, make a chalk mark on the wheel opposite the belt joint and pull the belt around one revolution, meanwhile counting the revolutions of the wheel. The product of these gives the number of revolutions per minute of the wheel. In the present case the number for the belt is 117, and for the wheel is 41 for each revolution of the belt. Multiplying gives 4797, which is close to directions and gives good results.

Elgin, Ill. GUS HAESSLER.

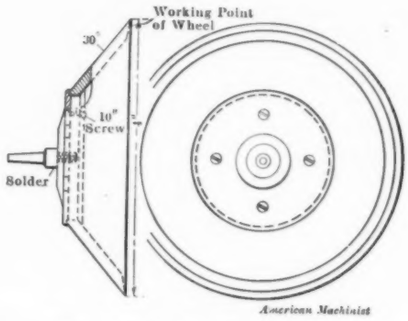


FIG. 2. DISK-WHEEL MOUNT

In a paper delivered before the School of Marine Engineering dealing with the question of burning liquid fuel it was said: As regards the safety of oil, it has been shown that oil having a flash point of 239 degrees Fahrenheit would not ignite if fired into with a shell, nor would dynamite exploded in a reservoir of this oil do more than throw up jets of oil which would not ignite. Any danger with liquid fuel is practically confined to those oils which have not parted with their inflammable and volatile gases, and this is a danger with oils when used absolutely crude. When these portions are removed, however, as is the case with all ordinary commercial fuel oils, oil is safe, and, moreover, unlike coal, it contains no power of spontaneous combustion. It is claimed that oil with a fire test of 180 to 200 degrees Fahrenheit is as safe as coal, which will sometimes ignite spontaneously, and at 250 to 300 degrees a red-hot poker will not ignite oil stirred by it, neither will hot coals do so if thrown into it.

Discussion of Previous Question

Letters from our readers showing how many men of many minds look upon various subjects opened up in previous numbers

Drilling Into a Steel Safe

The article submitted by E. V., page 507, Volume 34, on Turning Hardened Steel, recalls to my mind a job that was brought to our shop some time ago.

A small country bank out in the State had been destroyed by fire. All the books and ready cash, amounting to $8000, were in one of those spherical manganese safes which, no doubt, the readers have seen. These safes are said to be burglar and drill proof. After the fire, the safe was dragged out into the open and many futile attempts, by safe experts, were made to open it. The dials, spindles and levers all being stuck so tight that it was impossible to move them, in spite of heavy blows with sledges and a deluge with kerosene, it was shipped to our shop to be opened at all hazards. After much persuasion with a light hammer and heating and suddenly cooling the lock

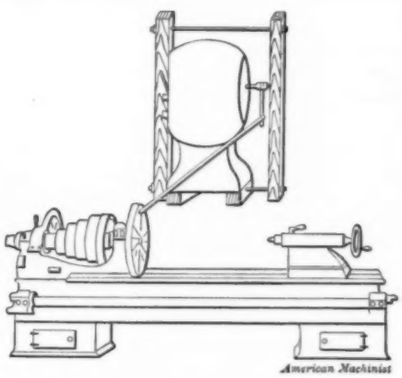


FIG. 1. DRILLING A STEEL SAFE—AN UNSUCCESSFUL SCHEME

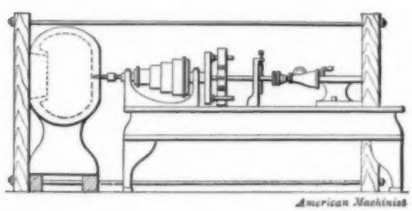


FIG. 2. DRILLING A STEEL SAFE—THE WAY IT WAS DONE

spindle, we finally got it to move, but in vain, for the timelock arrangements inside the safe were hooked up and the clocks were either stopped or damaged so that it was impossible to unlock the safe door from the outside. It was then up to us to get inside and unhook the timelock, and anyone who has had any experience with this particular steel will admit that drilling it is one of the most heart-breaking jobs imaginable.

We rigged up a heavy ratchet with a 1⅛-inch flat drill, a piece of 1⅛-inch pipe about 5 feet long for a handle, and put two men to work on it, and after about two hours of hard pulling and changing of drills, we were rewarded by seeing a bright spot about ¼ inch in diameter at the point of the drill. Seeing that it was useless to proceed in this manner, the safe being 3¼ inches thick where we were drilling, we next made up the rig shown in Fig. 1, on a 20-inch lathe, and with one man at the lathe shipper, one at the ratchet and one at the forge, forging and dressing up square-shank flat drills of Novo steel and hardening them as hard as fire and salt water would make them, we began to get slightly better results. Our next move was to reduce the speed of the lathe spindle to about 15 revolutions per minute, which helped considerable, but after six hours' drilling in this manner and gaining only ⅛ inch in depth of full-sized hole, we came to the conclusion that what we needed was steady, slow movement of the drill and very great pressure, so the rig shown in Fig. 2 was made up, and after 52 hours of continuous work and using up a 10-foot bar of 1-inch Novo steel, we succeeded in getting our hole through, and after two hours' more of coaxing time locks and combinations, the door opened and showed everything inside intact.

The failure of the time locks was due to the fact that the dials had been mounted with shellac and during the fire this had melted and run down into the mechanism and stopped the clocks.

In explanation of Fig. 2, I might state that the lathe spindle had a nice, smooth 1¼-inch hole through it and the drill bar was made an easy fit to same. The screw jack was used to enable us to get a heavier pressure than was possible with the tailstock spindle alone, and also to facilitate the changing of drills which was necessary about every 15 or 20 minutes. The tailstock spindle was removed and the tailstock backed up and clamped against the heavy timber which held it safe in position. The thrust of the drill was taken by an old thrust bearing from a marine gas engine. This rig could be adapted to any big job which could not be handled in a drill press.

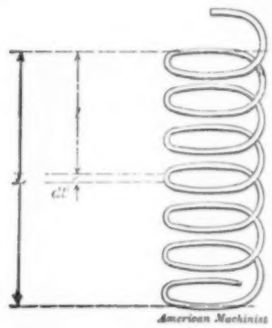
Drilling was the only possible means at hand of entering the safe, though, no doubt, some have thought of electric arcs and autogenous flames, but for one out here in the wilds, those things are hard to get hold of, and I have my doubts as to whether they would be practicable on this particular job. The hole, which was about 1⅛ inches at the start and 13/16 inch at the finish, was plugged with a piece of Novo steel riveted hot. The door and all mechanism were refitted and cleaned, the safe painted and refinished and is in use today. The weight of the safe was about 4700 pounds.

Omaha, Neb. JAY.

Effect of Spring Weight

Referring to the question of effect of its own weight upon the deflection of a helical spring, I calculate as follows:

Let



EFFECT OF SPRING WEIGHT

d = Diameter of the wire in inches;
D = Diameter of the coil in inches;
F = The deflection of one coil in inches;
E = The torsional modulus of elasticity;
P = The load on the spring in pounds, not including the weight of the spring itself;
L = The actual developed length of one coil;
N = The number of coils;
l = The actual developed length of any part of the spring;
w = The weight of the spring per unit of actual length;
W = The weight of one coil.
W_1 = The total weight of the spring.

The deflection of one coil, according to Begtrup's formula, is

$$F = \frac{8\,P\,(D-d)^3}{E\,d^4}.$$

The deflection of any other length l of

the coil will be the above divided by L, the length of one coil, and multiplied by l, or

$$F_1 = \frac{8 P l (D-d)^3}{L E d^4}.$$

If we wish to consider the deflection of a small section of the spring having an infinitesimal length dl, we have to substitute for l, in the last equation, the quantity dl, and for F_1, dF_1, giving

$$dF_1 = \frac{8 P (D-d)^3 dl}{L E d^4}.$$

If, now, the load causing dl to deflect is only the weight of the spring itself above the length dl, P will become wl, since wl is the weight of the spring above dl; then,

$$\int_0^{F_n} dF_1 = \int_0^{NL} \frac{8 (D-d)^3 w}{L E d^4} l\, dl.$$

Here we must integrate l between the limits of zero and NL, because NL is the total length of the spring, and we must integrate F between zero and F_n, if F_n represents the total deflection; therefore,

$$F_n = \frac{8 (D-d)^3 w}{L E d^4} \frac{N^2 L^2}{2}.$$

But wNL is equal to W_1, the total weight of the spring. Then,

$$F_n = \frac{8 (D-d)^3 N W_1}{E d^4} \frac{}{2},$$

which is the total deflection of the spring, due to its own weight.

This shows, then, that one-half of the weight of the spring should be considered when measuring the total deflection from the condition of the spring being first laid out horizontally and entirely free. It is better, however, to consider the *increased* deflection due to each *increase* of load applied and thus eliminate the effect of spring weight.

A. HOFMANN,
Chief Engineer Sales Department
Ingersoll-Rand Company.

New York City.

Bolts for Flange Couplings

James H. Carver on page 585, shows us how to figure the number and size of bolts to use in a coupling for different sized shafts. If anyone now uses flange couplings, that may be all right; but, while he has tackled the problem in the natural way, taking the size of the shaft as a basis, to my way of thinking, is beginning at the wrong end.

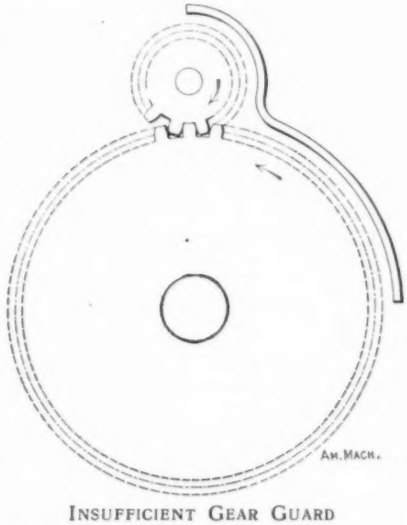
There cannot be over eight sizes of bolts used in any sized shafts under 6- or 8-inch shafts, and, if Mr. Carver had given us an eight-line table showing what shafts these bolts would be right for, we would not have any figuring to do. His figuring might bring a 9/16- or 15/16-inch bolt; but no one would ever be fool enough to specify such a bolt, unless it was a book man.

Another thing; how often does the shearing strength of even one bolt come in? So long as there are thousands of Shaw couplings driving all right by a grip fit on the shafts, what help do two flanges three or four times the diameter of the shaft, firmly bolted together, need of the shearing strength of the bolts?

Johnstown, Penn. J. O. H.

Safeguards for Gears

I read Oberlin Smith's article on the above subject, appearing on page 469, with a great deal of interest. Mr. Smith states that he has known of comparatively few cases of accidents due to uncovered gears and that he uses a partial gear covering in place of covering the gears completely, unless so ordered by the purchaser. My own experience has been much the same in regard to the small number, or rather small percentage, of accidents due to exposed gears; but one accident, that I recall in particular, causes me to doubt the value of the partial guards.



INSUFFICIENT GEAR GUARD

The case in mind was a large gear, meshing with a pinion directly above. A partial guard had been placed over the gears as shown in the illustration. In some manner a few drops of oil had accumulated on the top of the guard and the operator wiped it down with a piece of waste. He was not paying a great deal of attention to the operation, probably because the guard in place had inspired him with a sense of safety. His stroke did not stop at the edge of the guard, his fingers caught between the teeth of the gear and the guard, and he is now minus parts of several of his fingers.

This example may be a little far fetched, but it is an actual case and leads me to the opinion that if any guard at all is installed, it should be as completely safe as it is possible to make it. A person seeing the danger point covered is not liable to be particularly careful in its vicinity. In the illustration the point at which the guard stops seems to be just about as dangerous, and more accessible, than the point where the gears mesh. "Anything that is worth doing at all is worth doing well."

Milwaukee, Wis. JOHN BAILEY.

How I Would Perforate Those Sheets

In reply to the query on page 747, there ought to be no difficulty about perforating 0.065-inch stock with an eighth-inch punch. If the dimensions were reversed some trouble might be expected.

I would first go over the press very carefully. See that the ram is properly fitted, square with the bed and no appreciable shake anywhere.

I would make the die with a spring stripper to support the punches. The punches would never be out of the stripper and the stripper would be so supported that it would have no shake.

The punches I would make of drill rod and fit them so that they could easily be replaced should they break.

Regarding the rotary method, I think this is impossible. I tried it once on thin stock, about 0.005 thick. With very carefully made rolls and accurate gearing the results were absolutely rotten. If the press is weak and liable to spring it would be necessary to subpress the job.

New York. E. A. DIXIE.

Correcting Wrongly Drilled Holes

On reading the criticism of this article on page 603, Volume 34, I was interested enough to refer to it again to make sure I understood the point at issue, and now write to say this method is not only possible, but very simple and useful.

I have had occasion to use this idea, which is very old with me, quite a number of times to elongate as well as correct holes, and I assure Linton Collins that it can be done.

H. R. G. was rather terse in his explanation, so I will give a few hints to amplify him: Use as short a drill as possible, lock the drill-press arm and saddle and grind the drill to a short point.

The angle of the point governs the tendency to run, and in extreme cases, use a bottoming drill, although this is rarely necessary if the drill is sharp and fed easily.

Philadelphia, Penn. E. J. R.

Fan Dynamameter Test for Auto Chassis

As far as the idea goes of testing the practically complete chassis of an automobile by means of a fan dynamometer, as described by C. B. Edwards, on page 786 the scheme is a good one. It is not new, however, as is evidenced by the much more complete and scientific testing apparatus described by John Squires, on page 156.

There are several glaring defects in Mr. Edwards' device. First, he apparently has no way of measuring the power absorbed by the fan. How does he know

whether or not his motor is being tested at full power, half power, or any other figure? And how does he know it is developing the correct power at any time?

Next, he says, "It follows also that the faster they (the fan blades) are driven, the greater will be the power absorbed and thus the load upon the motor is varied exactly as under actual running conditions." Now, it is fairly well known that a fan, such as is described, absorbs power about proportional to the cube of the speed, whereas an automobile is said to require it at a rate considerably less than the square of the speed. This will mean that at high speeds the engine must deliver more power than the car will require; or else, at slow speeds the engine will not be delivering as much as will be needed.

Of course, the fan blades are adjustable (when at rest), but it remains true that the fan will absorb the correct power at only one speed for each adjustment of the fan. How serious a defect this is, I don't know, because I am not an automobile expert; but while one is making testing apparatus, why not build something, not only adjustable, but something by which one may *measure* the power developed at every speed, so that one can know exactly what is going on at all times, instead of guessing?

It is not necessary even to go to the refinements of Mr. Squires' apparatus. Why not use a water brake, such as is used by builders of steam turbines? These devices are essentially paddle rotors caused to revolve inside an internally ribbed shell. The shell is supported only by its bearings on the rotor shaft, but has an arm extending out at right angles to the shaft and resting upon a scale platform. Through a suitable opening in the top of the shell a stream of water is admitted, which is violently churned up and thrown against the ribs of the shell by the rotor.

This churning and throwing of water tend to cause the shell to turn with the rotor, but it is resisted by the projecting arm, the pressure of which is weighed by the scale. A schoolboy calculation involving the scale reading, the speed of the rotor and the length of the lever arm, gives the horsepower directly and accurately.

The power of the machine being tested is, of course, absorbed in heating the water as it is churned up, in fact it is necessary to keep the stream constantly flowing in and running out of an overflow to prevent its being boiled away, with a consequent entire removal of load and possible racing.

It may not be clear why, as the power is absorbed solely in heating the water, a measure of the power may be obtained from the pressure on the scale only, and neglecting the heat going out with the water. The explanation is this: all the *power* goes off as heat, no work is done on the scale, only *pressure* without motion being determined by the scale. Just as all the power goes out with the water, all the *pressure* is measured by the scale, as the water flows out quietly, with no more velocity than that with which it entered. The water is thrown, of course, but inside and against the casing, this very action resulting in the pressure measured by the scale and this pressure is then, with the rotative speed, a direct function of the power being absorbed in heating the water.

By varying the quantity of water flowing into the shell, the amount of power absorbed may be varied, while running, so the power absorbed by the water brake is not tied up relentlessly with the speed. All adjustments are independent and, best of all, by reading scale pressure and speed, you know exactly what you are doing.

New York City. R. S. BAYARD.

Bronze and Cast Iron Boxes

Your correspondents from Bridgeport, Edmund S. Williams and Clarence Sterling, make the pro and con of the advantages of bronze boxes over the cast iron (or the reverse) come so near neutralizing each other that they hardly call

THE JOHN STEPTOE SHAPER COMPANY'S PRACTICE WITH OIL GROOVES

for a reply from me, except as I took the view that the cast iron was the better of the two. It may be proper to refer to the experience of outside parties, the John Steptoe Shaper Company, of Cincinnati, who write as follows:

"We have been using cast-iron bearings in all our machines since July, 1909. Since that time we have turned out over 500 machines, and we have yet the first complaint to receive with regard to the bearings running hot; but we have made proper provisions for the distribution of the oil over the bearings.

"You will note that we have chased spiral oil grooves in the shaft, as shown in the illustration, and we have provided the bearings with ring oilers, so that they are constantly flooded with oil.

"From the 500 machines which we have turned out, we have not had a complaint, and we believe that the cast-iron box is the best bearing we have ever put in our machine.

"In addition to that experience, we have in our shop a Jones & Lamson turret lathe, on which the clutch pulleys on the countershaft were giving us no end of trouble. The pulleys were bushed with bronze bushes, and every three or four weeks we were compelled to take these pulleys down and scrape the bronze bushings. Not only the bushings, but the shaft itself would get in very bad shape. We eventually got tired of that, and took the countershaft down and bushed these pulleys with cast-iron bushings and chased spiral oil grooves in the shaft, the same as shown in this illustration. This occurred about six months ago, and we have never since had a minute's trouble, and the machine has never stood idle since that time on account of repairs to the countershaft.

"We have a Stowe flexible shaft in our shop. The loose pulley on this countershaft was giving us trouble, the same as the one on the Jones & Lamson turret lathe. We took that pulley down, bushed it and chased spiral oil grooves in it about nine months ago, and we have never had any trouble since.

"We had this same trouble with a loose pulley on a Barnes drill press. We took that loose pulley off and bushed it about a year ago, and we have never had a minute's trouble since that time with this drill press.

"It is absolutely essential, however, to make provisions for proper oiling by chasing oil grooves in the shaft. Up to about a year ago, we bored the bearings in our triple-geared shapers out of the solid cast iron, and, in 1908, when things were very dull with us, we decided to get rid of all of our old machines. We had a triple-geared shaper in our shop, which, as nearly as we could tell, was about 12 years old. We sold this machine to the C. C. Wormer Machinery Company, of Detroit, agreeing to put in good condition before shipping to them. We noticed that the shafts in the bearings were very loose. We took the machine apart, naturally supposing that the bearings were badly worn; but we found that these bearings had become glazed, and were as perfect as the day they were made, but the shaft had been worn. At that time we did not chase spiral oil grooves in the shaft as we now do.

"We have a large planer in our shop at the present time, on which the loose pulley on the countershaft is giving us trouble and, within the next week, we are going to place cast-iron bushings in this pulley."

It will be seen that they lay special stress on the distribution of the lubricant, and do it in a way directly the reverse of common practice. Well, why not? If a shaft, for instance, lies on the bottom of the box, only one-half of the box has to stand what the whole circumference of the journal does. Then why not cut the oil grooves in the shaft? The result cannot be other than a better distribution of the lubricant. What the man, who has no measure of results except the immediate almighty dollar, will say is, that the oil ring and grooves cost too much and, if there is any trouble in

the use of the machine, that is up to the customer. It is a wonder to me why most machine-tool builders continue supplying the same old countershafts, which are not half as complete as they can be made at a slight additional expense. The modern builders seem to be willing to spend a hundred dollars or so on a box full of change gears, but shy at a few dollars extra on a countershaft.

A sample of a good one was shown in connection with the Artisan School speed lathe, which was published in the AMERICAN MACHINIST, page 298, Volume 31, Part 2.

The upper cone has a belt shifter operated by a handle, the belt on the tight and loose pulleys is shifted by another handle and, when the belt is thrown to the loose pulley, a brake block striking the tight pulley, stops the lathe. Stationary flanges each side of the tight and loose and cone pulleys render it impossible for the belt to get off, and the bearings of both the line shaft and loose pulley are oiled from the ends of the shaft, which has this advantage, that the oil put in cannot get out any way, except by going through the bearing, and the oiling can be done whether the shaft is running or at rest.

Mr. Sterling asks what I think the best form and material for the front bearing of our engine lathe? I can only say that in the Artisan lathe, which is the last whack I had at the job, I put a ground steel shaft in a solid cast-iron box, scraped to a good fit and equipped with ring oilers. The outside of the box fitted in a conical seat with a nut at each end, but was not split, for, when they first become loose, the boxes will compress enough without splitting and, when not enough, they can be split. The inner nuts on the conical boxes had flanges cast on so as to form the stationary flanges to the cone, as all belt flanges should be stationary.

Regarding the compressibility of the unsplit box, William Sellers told me of their way of making a lathe bearing box, which may be better than the one above described. The headstock was made as usual with bolted-on caps and cast-iron unsplit sleeves. When they wanted to compensate for wear, they took out the shaft and bushings and laid tissue paper around the bush, and that would compress it enough to take up the wear and, when worn more, they used thicker paper. The journal was not hardened, and this brings up the question whether a hardened journal will endure longer than a soft one? Of course, we all know it ought, but we found that a common gray-iron crosshead pin in an engine would last much longer than a hardened-steel one, or, to put it another way, the hardened pins wore out and the cast-iron ones do not.

Since the above was written, the article by R. K. Le Blond has settled, so far as lathe construction goes, one of the points under discussion and, as to the Steptoe method of distributing the oil, we allow where possible (such as in line and countershafts) ¼ inch end play, and this not only helps to distribute the lubricant, but prevents streaking up effectually.

One party's experience with cast-iron boxes for polishing wheels, Sellers' with line shafts and the other party's with machine tools would seem to indicate that, if made and used right, cast iron is best. Of course, those who are using and have built up a business with bronze boxes are not going to change, at least, until customers demand it; but, for the new concern, this discussion ought to be of use.

Syracuse, N. Y. JOHN E. SWEET.

Finishing Machinery—Rotating Apprentice Work

Mr. Watcher's plea for simplicity in machine-tool finish is very nearly as old as the tool business. When I was a very small boy they were kicking because the trade demanded so much expense in the pattern shop and foundry with the curious and wierd carvings and architectural monstrosities that seemed to fill the mechanical mind. When that passed there came a period when nothing would do but the skeleton of the machine with not even a fig leaf allowed to conceal its nakedness. Then began the foundryman's and the paintman's troubles.

The old castings had so many holes and bumps that a few blow holes and swells were unnoticeable. The new order meant better castings in reality, but since they could be molded by cheaper men they were molded by them with the result that no amount of paint would cover the defects that were simply painted over with no pretense at filler other than a few pounds of putty in the largest holes. Then, and comparatively recently, came the era of broad flat or regularly curved surfaces. With this came a degree of artistic sense that said that a flat surface did not look well unless it was flat and that a curved surface must be a smooth curve.

Then came filler. Someone thought it was cheaper to slop on a lot of filler with a brush and sandpaper it down than to make good castings. Then they found that filler brushed on only filled minute depressions and that castings needed plastering exactly as much as a house. So now we buy castings, any shape any size and using them as a foundation we build on with filler just as an actor builds a nose of wax, and behold we have a machine that is well nigh perfect in contour, and that has somewhere inside it a reinforcement of cast iron to hold up the filler on the outside.

Why not buy castings the shape we want them, brush over a coat of filler to hold the paint, and a coat or two of paint and sell them?

Mr. Dooley, at page 542, gives us one of the best statements of the need of educated machinists that has yet appeared. The method of rotation in the shops, while a common one, set me to thinking with the result that I believe there is a better way, one that for lack of a better name I shall call rotation in an ascending spiral (or helix?).

The idea would be for a boy to begin, wherever there is room for him, stay there on simple work, not necessarily rough work, for say a quarter of his allotted time, then go to the next machine in order for one quarter of his allotted time and so on until he got around where he started, when he would go back to the original department and take the second quarter of his allotted time there on work somewhat more difficult and requiring greater, dexterity and mental capacity.

This would go on until the last time around the shop he would spend the last quarter of his time in each department on the very best and most difficult work that the shop afforded. In this way there would be avoided the serious difficulty that the boy at the end of his time would have forgotten much of what he learned on the first machine on which he was started and which he left before he was mature enough to thoroughly understand.

It seems also if Mr. Dooley is correctly quoted, that two of the most important functions of the machinist have no place in the shop course, laying out work and erecting. This is the old, old mistake of the manual-training people. They consider that a machinist is an operator and that when he has learned to operate certain hand and power tools he is a finished machinist. Nothing can be further from the truth. A man who cannot lay out and plan his work from the drawing and erect it into a finished machine should not be rated a machinist.

Why do schools, which are proverbially short of money, always have such a hankering for individual motor drives on their machinery? On heavy tools requiring 10 horsepower to drive, the motor and wiring become a minor item and the convenience of placing often justifies the expense. The electrical manufacturers, of course, advertise their wares by using them and it is nothing surprising that their shops have what they very naturally call, up-to-the-minute machinery. The electric drive is advancing rapidly but the group drive is carrying most of the small and medium tools.

Looking through the advertising pages of the AMERICAN MACHINIST recently I found that only 1/13 of all the machine tools advertised were shown with individual drives and only ⅛ had gear boxes driven by a single-speed pulley, which rather appears to indicate that a sane view of the situation is becoming more common. ENTROPY.

"Machine Tool"—A Misnomer

By Charles E. Hildreth*

A discussion of the propriety of the term "machine tool" and how the product is named by other nations.

A plea for a general housecleaning of names and terms in the industry that have no reason for their existence.

*Vice-president and treasurer, Whitcomb-Blaisdell Machine Tool Company, Worcester, Mass.

During the Nineteenth century the machine industry of this country was undergoing what might be termed a process of development. Our laws were framed to protect this industry and the inventive faculties of our skilled mechanics were turned to the development of machines that should have the highest efficiency, coupled with the most improved design.

The wonderful results of this age of development are too well known to require enumeration.

During this period the trade went through a changing variety of names until to Americans the title "machine tool," by means of an involved process of deduction, induction and extension became the accepted term for the product, and this, in spite of all reason and logic, just because it should be so, since custom has made it so.

Now, however, we are entering upon a new era. The Twentieth century is very evidently to be one of expansion.

We early learned that all motion is founded on fixed laws, the first of which is, that "a body at rest remains at rest, and a body in motion moves with uniform velocity in a straight line, *unless acted upon by some external force* to change its condition."

Can we hope to change this law of nature and expect a rapid and continuous advance of world-wide trade if we attempt to force a name that is purely colloquial to America, on a world-wide product?

To all the nations, the word "tool" is held to mean "an implement adapted to be used by one person, and depending for its effect upon the strength and skill of the operator."

The Germans are probably the most technically correct of any nation, in the use of terms in all the sciences. Their word for "tool" is "Werkzeug," and for machine "Maschine," but when they wish to express what we call a machine tool they say "Werkzeugmaschine," strictly translated a tool machine, since in the German language, as in the English, the adjective precedes the noun.

The French and Italians would seem, at first glance, to have adopted our form, when we find the former generally advertising this product as a "machine-outil" and the latter as a "macchina utensile," but if we will remember that in these languages the adjective almost always follows the noun, it will seem that the meaning conveyed to the French and Italian minds is most likely "tool machine." The same is true of Spanish and Portugese, where we find the analogous compounds, "máquina herramienta," and "machina ferramenta," respectively, although our authorities are not agreed as to the order in which these words are placed.

The Russians have one word to signify all machines and that is "stanok." When they desire to specify a turning machine or, as we say, a lathe, which, by the way never lathes anything, they say "tokarny stanok," or turning machine. So far as the writer can discover, they have no general term for the product as a whole.

Enough, then, for this evidence of one counter *force* that will inevitably tend to mitigate against our foreign trade, following fully and freely the first law of motion.

What are the conditions within our own borders? We have here the same meaning for the word "tool," our best dictionaries give it this meaning and it is generally accepted by all classes of trade. Our industry alone has introduced confusion by coining a term to fit our product which not only cannot be backed by logic, but tends to confuse.

Webster says: "A machine is any contrivance which serves to produce or change motion," and describes a "tool" as "an instrument, such as a hammer, saw, drill, tap and the like, employed for facilitating mechanical operations."

The machine, then, is the contrivance only, which serves to produce or change the motion of the tool or instrument, employed to facilitate such mechanical operations as turning, drilling, milling, grinding, etc.

Now, a tool may apply to an infinite variety of instruments, such as a drill, mill, die, borer, emery wheel, etc., to facilitate such mechanical operations as drilling, milling, screw cutting, boring, grinding, etc., the proper motion for which is produced by such contrivances as drilling machines, milling machines, screw-cutting machines, boring machines, grinding machines, etc. Or a tool may apply to a hammer, a plane, a pick or a shovel, to facilitate such human mechanical operations as driving a nail, planing a board, picking gravel or shoveling dirt, the proper motion for which is produced by man, who, in the continued performance of these operations, without using his brain, is said to become little better than a machine.

A tool, then, would seem to mean only the instrument and the machine only the contrivance employed to drive or control the instrument.

Tools are subdivided into two distinct classes, machine tools and hand tools. Machine tools may be for either wood-working or metal-working machines, while hand tools may be used in all classes of work where man is employed.

The tools we never make nor do we usually advertise them except as an extra. The machine tools and hand tools are made and sold by others, who are really the manufacturers of "machine tools" and "hand tools."

It is only the machine we build, advertise and sell, calling attention to its construction, to its many points of superiority over a competitive article.

An old custom was to call our product "machinist's tools." This has long since been discontinued, as it has generally been conceded that the machinist's tools are his hammer, prick punch, caliper, scale, etc., as the carpenter's tools are his hammer, adze, plane, square, etc. Thus, we see that our common acceptance of the term "tool" is identical with that of all nations and for which there is the simplest form of entrance into all these languages. Therefore, if we would advance our products under terms perfectly clear to all, it is up to us to adopt a term that is logically correct in our own.

Why, then, should we, as a trade, introduce into Nature's first law of motion, under which the expansion of our trade would move in a straight line, *unless acted upon by some external force*, a name for which there is absolutely no concurrent form in any other language and absolutely no train of reasoning by which we can make it logically correct in our own.

Machine in our present term is really the adjective descriptive of the tool, which we have idealized into being the machine itself and making the whole term a compound noun, the name of our product. A process at once labored and confusing since we also have other articles with the same term clearly known by that term throughout the world.

Reasoning from the above, we manufacture a machine. To accomplish the results for which this machine was designed it must have a tool. The designs of our machines have nearly always depended largely on the efficiency of this tool.

In the days of the old tool steel, our turning, drilling, boring machines, etc.,

were designed of sufficient strength to get all the work out of the tool that it would stand, but with the advent of later high-speed steels, not only these, but all metal-working machines, had to be almost entirely redesigned to transmit sufficient power to the modern tool. It is then in the final analysis, upon the efficiency of the forming or cutting tool that the real success of our machines depend. Therefore, by both logic and reason would not our product be most fittingly called a "tool machine," and under this name would it not be readily recognized in every market? This product, "tool machines," would then be subdivided into: (1) Metal-working machines; (2) wood-working machines, there being no good and sfficient reason why one is not just as well qualified as the other to be included therein.

Both contain the highest types of the Twentieth century machine designer's skill, and while one uses the latest metal-working tools, the other demands the latest wood-working tools, both being essentially "tool machines."

Our field now being clearly defined to include only machines that use some form of a tool or instrument for forming or reducing such materials as metal or wood, we can define same as follows:

A tool machine is any hand or power-driven mechanism to actuate either the tool, the material to be operated upon by the tool, or both, designed for the purpose of cutting metal, wood or other substances.

We should not, however, be satisfied to stop here, but should undertake a general house-cleaning of names in the trade that have no reason for their existence.

As mentioned before, our lathes never lathe anything, nor does an engine lathe mean anything, but under the title of turning machines, subdivided into cone drive, single pulley drive, etc., we are not only clear and logical to ourselves, but understood without a question of doubt by foreigners.

By what right do the upright drilling-machine manufacturers lay any claim to their machines, or themselves for that matter, to being any more upright than the boring- or milling-machine manufacturers who are technically correct when they modestly advertise their product as being vertical?

Ask the grinding-machine manufacturers if any of their machines were ever designed to grind floors or benches, and yet they unblushingly advertise and would evidently try to make a poor foreigner believe that their floor grinders and bench grinders were made for those special purposes.

In the main, our trade is pretty free from these technical inaccuracies, but where a few have crept in, why not make a reform that will not only be clear to us, but greatly simplify our advertising in foreign catalogs, with which we seek to distribute our products to all nations of the earth?

A Ring Gage Problem

BY F. WEBSTER

It was necessary to make a number of ring gages to fit over three pins. Two of these pins were of the same diameter, but the third pin was of a different diameter, and the set of gages had to be made so as to accommodate several different sizes of the third pin.

In Fig. 1 are shown the two equal pins A and B, the larger pin C and the ring gage D. The problem that bothered us in the shop was to find the diameter of the gage, not only for one size of pins, but to get a formula that could be applied easily to cover any size of the larger pin C. The solution of the problem is given in connection with Fig. 2, as follows:

For one gage the small pins A and B are 0.3 inch diameter and the distance from the center of the large pin C to the center line AB is to be 0.4 inch; what should be the diameter of the gage?

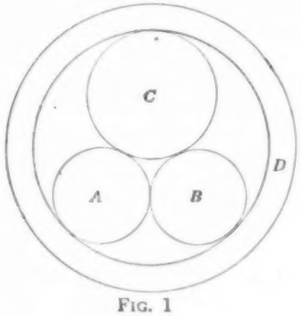


FIG. 1

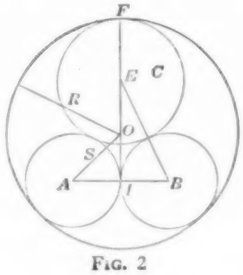


FIG. 2

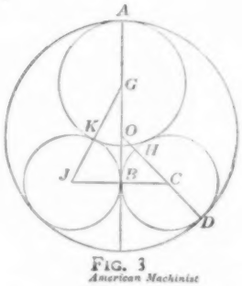


FIG. 3
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THE RING-GAGE PROBLEM AND ITS SOLUTION

Draw the construction lines showing the radius R of the gage, the line K from the center line AB to the gage center O, and the line S from the center of one of the small pins to the gage center. First, find the diameter of the large pin C by use of the right-angled triangle formula:

$$BE = \sqrt{EI^2 + IB^2} = \sqrt{0.4^2 + 0.15^2} = 0.4272.$$

The radius of pin C is $0.4272 - 0.15 = 0.2772$ inch, and its diameter $= 0.2772 \times 2 = 0.5544$ inch. The length from the center line at I, on AB, to the tangent point F, between the large pin C and the gage, is $0.4 + 0.2772 = 0.6772$ inch.

From the data given above, three equations can be written:

(1) $R = 0.6772 - IO;$

(2) $R = S + 0.15;$

(3) $IO^2 = S^2 - 0.15^2.$

By equating the right-hand members of (1) and (2), $S + 0.15 = 0.6772 - IO$, or $IO = 0.5272 - S$. Square this value of IO and substitute in formula (3), as follows: $IO^2 = 0.278 - 1.054S + S^2 = S^2 - 0.15^2 = S^2 - 0.0225$. Hence, by solving, $1.054S = 0.3005$, and $S = \frac{0.3005}{1.054} = 0.285$. Then, from equation (2), $R = 0.285 + 0.15 = 0.435$ inch, and the diameter of the gage must be $0.435 \times 2 = 0.870$ inch.

Another form of solution of this problem, giving one formula for R, is shown below in connection with Fig. 3. Let $OD = R$; then, from the construction lines as drawn, the following proportions hold good: $OD:OB::OB:OH$; $OB = AB - OA = AB - R$; $OH = OD - HD = R - HD$; $R:AB - R::AB - R:R - HD$, and $R = \frac{AB^2}{(2AB - HD)}$.

The use of this formula for R involves the value of AB, which is the same as IF in Fig. 2, and this value varies, of course, with the size of the large pin. It is, therefore, convenient to have a formula for calculating the value of AB to be used in the formula for R. Such a formula may be developed as follows:

$$AB = AG + GB = GK + GB;$$
$$GK = GJ - KJ;$$

and

$$GJ = \sqrt{GB^2 + JB^2}.$$

Also,

$$KJ = JB;$$

hence,

$$GK = \sqrt{GB^2 + JB^2} - JB.$$

Therefore,

$$AB = \sqrt{GB^2 + JB^2} - JB + GB.$$

These values are all known, for GB is the distance from the center line of the small pins to the center of the large pin, and JB is the radius of the small pin.

At the Experiment Station of the United States Bureau of Mines, Pittsburg, Penn., several trial runs have been made with an experimental gas producer, using coke as fuel, with which limestone has been mixed in varying proportions, the purpose being to flux the ash and form a liquid slag, thus avoiding clinker and ash troubles and consequent shutdowns. Liquid slag has been readily made which runs freely from the producer. The high temperatures necessary are very efficient in the generation of gas.

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American Machinist

Is "Machine Tool" the Proper Term?

A recent headline in a daily paper puts a new phase on the question of a proper definition for "machine tool" which some of us have been seriously considering. It read "Machine Tool Tries to Confuse Probe" and, when we study it a bit, it shows us that our use of the term "machine tool" is illogical and incorrect.

While this headline refers to the tool of a political machine it shows very clearly that "tool" is the noun and that "machine" is the adjective defining the kind of a tool. Following this line of reasoning we see that a milling cutter is properly a machine tool because it is a tool made for a machine, while the milling machine itself cannot be a machine tool, but is the machine in which the tool is used.

This brings us face to face with the fact that it would be much more correct, even if less euphonious, to say "tool machine" because this tells what kind of a machine it is, or that it is a machine for using tools; which our present term does not logically do.

In the early days of the industry, letter heads and modest sign boards referred to lathes and planers as "machinists' tools," but this term has more properly come to mean just what it implies—tools for machinists—and refers to squares, micrometers and similar tools. By the same token "machine tools" cannot properly refer to machines at all, but only to the tools they use, tools being generally understood to mean the parts which actually perform the work on the piece held in the machine.

As "tool machine" does not roll smoothly on the tongue and as it refers equally to machines using tools of any kind, we shall have to make some distinction to prevent all machines, carrying tools for any purpose (even the needles of a knitting machine being tools in contact with work) coming into the same class.

While it is probably splitting hairs in many cases to insist on the word "metal" as many machines are used alternately on metal and wood, rubber or other substances, it looks as though we should have to use it if we are to preserve any individuality in the name of the kind of machines we build and use. And, unless we wish some such awkward combination as "metal-tool machines" we seem to be forced into using "metal-working machines" as a broad term that covers the whole line.

And the definition could also be simplified so that it might read something like this: "A metal-working machine is any mechanism consisting of a frame or bed requiring substantial support and one or more moving parts, for guiding the tool or the metal being operated on."

The building of metal-working machines will continue to increase in importance regardless of the name we give them and this is given solely as a suggestion for the consideration of those who feel that a term should mean what it says, rather than have an arbitrary meaning due to usage instead of logic. This question is being energetically taken up by Secretary Hildreth, of the Machine Tool Builders' Association, who has long felt that the common term was not correct, and it will probably be discussed at the Atlantic City convention.

Prevention of Industrial Accidents

It is a source of gratification that the forthcoming annual convention of the National Association of Manufacturers is to inaugurate a concerted effort to reduce the great number of industrial accidents in this country. The report of two special commissioners will be presented, based upon an exhaustive investigation of accident prevention and relief methods in Europe. On the work of this committee and the preparation of report in book form, the association has spent some $30,000, considering that it is a work done for all American manufacturers, not merely for the members of their own organization.

The president of the association has thus outlined the work that has been done and the forward movement.

"The purpose of the work is primarily educational, but we have now reached the point where theoretical discussion must give way to practical demonstration, which will result in prevention of accidents as far as human energy and intelligence can bring it about. The whole plan as comprehended by the National Association of Manufacturers, is to afford all classes, the public, the workman and the employer, an opportunity intelligently to readjust existing conditions to the end that industrial accidents will be reduced to a minimum and the injured or incapacitated given the maximum relief from every dollar expended for that purpose."

We find another source of gratification in noting among the names of manufacturing firms directly and actively interested in the movement, many well known machine-building companies. Further the present attitude of manufacturers in general we believe is reflected by this para-

graph from the official organ of the Association.

"The time is past for argument as to responsibility for conditions. The urgent need of action is beyond dispute. The public is directly concerned in an immediate solution; the workman is vitally interested, and the manufacturer frankly acknowledges that wrongs exist and must be righted. How best to right the wrongs with equal justice to all is the problem. It would be manifestly absurd to abandon present methods for others equally unsatisfactory. It is well known that Germany, for instance, has studied the many questions involved. Is it not logical that we should seek to benefit by her experiences, and should adapt tried and proved methods to our needs? Every workman and employer should give the subjects careful consideration so that laws effective and equitable to both workman and employer will replace those which have become obsolete and an economical burden to our industries."

Lighting as an Asset to Factory Production

In the machine shop the efficiency of the machine ordinarily receives far more attention than the efficiency of the man. The efficiency of the workman, however, is often of greater moment than the efficiency of the machine.

In analyzing the items which make for man efficiency, the general conditions under which he works are of first importance. If the heating, the ventilating or the lighting is bad, there is not only a physical discomfort, but a mental discomfort as well, which consciously or unconsciously affect the disposition, the energy and the interest of the man in his work.

Illumination is attracting a new and increased interest and attention. This has come about partly through the modern efficiency movement and partly through the recent notable advances that have been made in the apparatus and the means of producing artificial light. Lighting is one of the things which, at first, seems very commonplace. Yet those who have followed carefully the recent articles on illumination in the machine shop and in the drafting room, will find that there are many simple principles and common-sense methods which have been overlooked and neglected, showing that there is a very important field in which relatively small investments in improving the facilities and the surroundings of workmen, by providing ample and proper lighting, may bring large financial returns in better and increased output. Many of these facts are immediately evident to the factory manager as soon as they are clearly stated.

At this time of the year one is apt to think that as lighting is needed principally in the winter months, the whole question may be left until the shortening days of the fall. Those in charge of shop work, however, will see the wisdom of foresight in this matter, for where lighting conditions are inadequate and where improvement is desirable before the winter months set in, preparation and installation work can well be undertaken during the preceding spring and summer months.

In changing from an old to a new system a considerable amount of time should be allowed for making a careful study of the situation, for drawing up plans of procedure, and for ordinary delays in the matter of securing the necessary material.

In view of the fact that maintenance and construction work on lighting systems is not usually so great in the summer as in the winter, the summer months afford an excellent opportunity for securing wiremen in connection with the installation or extension of lighting systems.

For these reasons foresight indicates the wisdom of an early start when improvements of this nature are contemplated for winter months still far ahead.

Personals

F. Mandon, general manager of Fenwick Fréres & Co., has returned to Paris, France.

F. J. Mawby, for several years with Vandyck Churchill Company, has joined the Peterson Engineer Company, of New York City.

E. M. Le Flufy, works manager of the Humphris Patent Gear Company, Eastleigh, Hants, England, is at present in this country on a few weeks' business stay.

H. S. Demarest, general manager of Greene, Tweed & Co., New York City, sailed for Europe on May 3, to remain abroad about two months in the interests of his company.

C. B. Warren, who has been sales manager of the Haynes Automobile Company, Kokomo, Ind., has been appointed general manager, succeeding H. R. Elmer, recently resigned.

James F. Barker, for several years principal of the Cleveland Technical High School, has been appointed director of technical and industrial department of the Jersey City High School.

Carl Von Goeben, who has been conducting an engineering practice in New York City, has accepted the position of works manager of the Payne & Joubert Machine and Foundry Company, Birmingham, Ala.

Frank H. Browning, who was formerly assistant chief draftsman of the hull department of the Fore River Shipbuilding Company, has become chief engineer of the Quincy-Manchester-Sargent Company, Plainfield, N. J.

Frederick Hughes, for the past six years chief engineer for the Driggs-Seabury Ordnance Corporation, Sharon, Penn., has joined the engineering staff of the New Departure Manufacturing Company, Bristol, Conn.

D. C. Fenner, formerly acting as superintendent of the truck department of the Knox Automobile Company, Springfield, Mass., has become sales manager of the Alden-Sampson Manufacturing Company, New York City.

Augustus H. Tuechter, president of the Cincinnati-Bickford Tool Company, Cincinnati, Ohio, will sail on May 17 for a four months' visit to Europe on the steamship "President Lincoln." Mr. Tuechter is taking his mother with him for the purpose of visiting her old home in southern Germany.

H. A. Croxton, until recently president and treasurer of the Masillon Iron and Steel Company, Masillon, Ohio, is now president and general manager of the Consolidated Motor Car Company, Cleveland, Ohio, which organization includes the Royal Tourist Car Company, the Croxton Motor Car Company, both of Cleveland, and the Frantz Body Company, Akron, Ohio.

Important Machine Tool Business Consolidation

At a recent meeting of the stockholders of the Windsor Machine Company, Windsor, Vt., James C. Potter and John Johnston, of the Potter & Johnston Machine Company, Pawtucket, R. I., were elected directors, replacing Charles A. Moore and R. P. Schwerin, and as a result the control of the Windsor company is taken over by the Pawtucket concern. G. O. Gridley, F. L. Cone and Maxwell Evarts remain members of the board. It is reported that the new organization is already looking for additional ground on which to construct factory buildings in Windsor, and that the plants in the two respective cities are to continue running to full capacity as heretofore.

Prentice Company Changes Hands

The George G. Prentice Company, Inc., of New Haven, Conn., has been taken over by the New Britain Machine Company, New Britain, Conn.

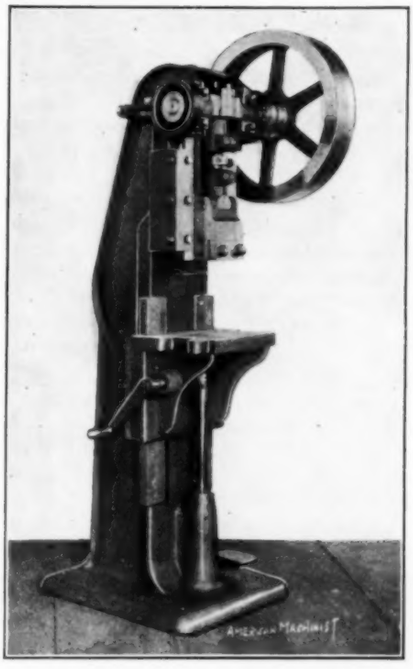
The plans of the new management do not thus far call for any important changes in the manufacturing departments of either of the plants, which are to continue operating as heretofore.

Mr. George G. Prentice, who retires from the business, contemplates a long rest to regain his health.

Shop Equipment News

Cutting, Forming and Horn Press

The press shown herewith consists of a box, body or frame, the front planed and finished, to which a bed or knee is fitted by planing and scraping, and is adjusted to any position desired by means of the crank handle shown on the side, which actuates through bevel gears to the vertical screw. The bed is then clamped



CUTTING, FORMING AND HORN PRESS

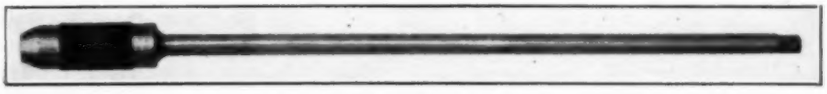
to the frame by tightening three nuts on each side, which makes it sufficiently rigid to use delicate cutting dies.

This style of press is also made with a hole through the body to which a horn can be fitted and a table or bed bolted in any fixed position that may be desired, which thus makes a combination cutting, forming and horn press.

The press is made in four sizes, weighing from 1000 to 4500 pounds, by the F. S. & G. L. Brown Machine Company, Baltimore, Md.

An Extension Tap Wrench

The halftone shows an extension tap holder manufactured by J. E. Poorman, 1722 St. Paul street, Philadelphia, Penn.



AN EXTENSION TAP WRENCH

It is 13 inches long, provided at one end with a chuck and at the other is squared to fit the chuck of the same size regular Poorman tap wrench.

ANY and all new or improved machines, tools or shop appliances of interest to men responsible for results in machinery-making plants will be briefly illustrated and described here — the machine shop news.
A more full and detailed description will be given — when it is real news — if it can appear here first — before it is sent to other papers. ALL descriptions appear in ALL four editions of the paper—Weekly, Monthly, Weekly English and Weekly German

A Small Hydraulic Press

This small hydraulic press, designed by the Watson-Stillman Company, New York, has proved useful in machine shops, where small parts are press fitted,

SMALL HYDRAULIC PRESS

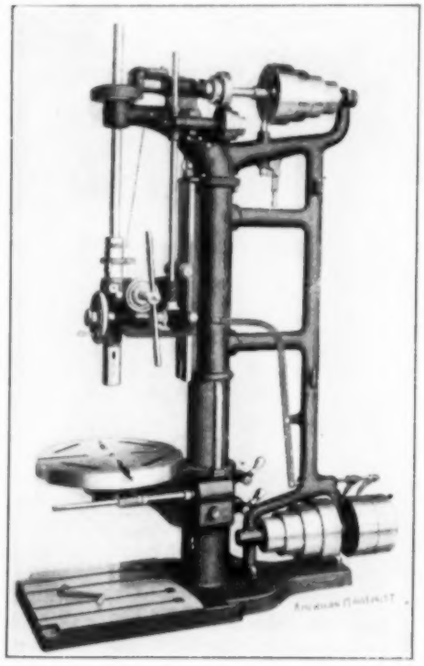
or where a high pressure must be brought to bear on any small article, whether for bending, straightening or flattening.

The convenient size makes it easily hauled from place to place. Quick movement of the ram is facilitated by the lever and connecting links shown at the left. The handle at the right on the extension lever socket will operate the pump easily where only light pressures are required and by applying the extension lever, the press will develop a pressure of 30 tons. The platen area is eight inches square; the platens are eight inches apart at maximum opening; the ram movement four inches. The base is 12x16 inches, and the hight of the press over all is 27 inches. The main cylinder is a steel forging, machined to fit perfectly into the reservoir and the pump cylinder is of bronze.

Sliding Head Driller

The illustration herewith shows a vertical 24-inch heavy-duty sliding-head driller, fitted with back gear, power feed, wheel and lever, and automatic stop.

The base is heavily constructed and ribbed to prevent springing. The column



SLIDING-HEAD DRILLER

is of large diameter, has a wide face for receiving the head and is supported by a back brace. The arm is provided with special clamping handles, raised and lowered by means of a worm gearing and

pinion on the rack, which arrangement holds the knee securely with no danger of it dropping, even with the clamp screws loose. The head is counterbalanced and is raised and lowered by a pinion on the rack.

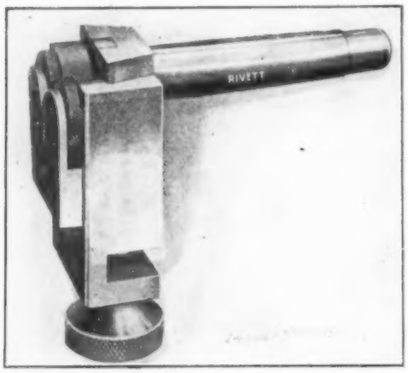
The spindle is made of high-carbon stock of large diameter, provided with quick return, and is operated by a steel rack and pinion and worm gearing. The spindle sleeve has a sliding collar for regulating the automatic stop-feed mechanism. The feed is from a three-step cone of large diameter. The crown bevel gears are protected and back gearing is inclosed in the cone pulley.

The tool is also furnished with a tilting table; the knee is made in two parts, on the outer end of which is a large flange, faced and bored to receive the swivel stem, on which the table stem fits. This flanged swivel has a worm gear cut on its periphery engaging with a worm mounted on a bracket on lower side. The worm shaft is squared on both ends for a wrench, allowing the table to be tilted to any angle desired on either side.

The driller is 7 feet ½ inch high, drills to center of 24½ inches and has a table traverse of table in column of 14 inches. It is a recent product of the Frontier Iron Works, Buffalo, N. Y.

A Tailstock Nurling Attachment

The halftone shows a new tailstock nurling attachment made by the Rivett Lathe Manufacturing Company, Brighton, Boston, Mass. The shank is hollow to



RIVETT TURRET AND TAILSTOCK NURLING ATTACHMENT

admit the work, and the nurls are mounted on the slide operated by the nurled thumbscrew.

Care and Use of Air Drills and Hammers

BY JAMES H. MAGUIRE

Since the introduction of air tools much has been said of their economy in some cases and their expense in others. But although they may be expensive to buy, and in some cases expensive to maintain, in large erecting establishments they have become indispensable.

As to their use, you can have one hundred men on a floor and under certain conditions get along with five drills and nobody will ever be waiting, and on the other hand, you can have eight or ten drills on the same job and still have a lot of hand drilling to do.

Just put your head to work and look around. You see jobs that some men are doing where they use a drill about four hours a day and when finished they put it on the floor, somewhere, so that even they, when wanting it later, may not know where to find it; others desiring to use a drill and not knowing just where to get one, may lose considerable time in searching. Another class of men, when through with a drill or hammer, will hide it or lock it up so as to be able to get it when they need it again. Either way is wrong. Some common place should be selected to keep the drills and hammers; a large pan on which to lay them so that the oil will not run on the floor, and pegs of about 4 or 5 inches in diameter arranged to hang the hose on. When not in use hose should never be left lying around on the floor where trucks and castings may injure it. When a man wishes to use a drill he goes to the pan and selects the one required for his work. He will find there a key for the chucks and a hose. If there are no drills there, the noise from where they are running, or the sight of the hose, if they are piped from above, attracts him to where the drills are in use. When through using the drill he returns it, together with the key and hose to the common keeping place, so that the next man that wants it may know just where to find it. Don't let every man who uses a drill try to repair it; he loses time and frequently spoils it. Have a man who is schooled in the mechanism of the various machines to look after the repairs and forbid others to touch them.

In choosing a hammer, care must be taken to get one just right for your work, if possible. Don't get one that has too strong a blow, any more than you would get one that would not be strong enough to accomplish the work desired of it. If the hammer is used, say, for snagging castings, and the blow delivered knocks off the snags, and then has some kick beyond, you are tiring your operator unnecessarily. A very neat and handy way to help a man using a hammer is to make a sling suspended from his shoulder to help him hold the hammer; it helps wonderfully.

A word about the use of drills. As it very often happens, it takes a much shorter time to drill a hole with an air drill than it takes to fasten the drill to the desired place. So look to your tackle and see that the brackets used to hold the drills can be not only applied firmly but quickly, and train your men to handle them with the least possible outlay of energy and time. Don't install air drills, hammers, lifts, etc., and then not make it pay.

We now come to the most important item in the care of air tools—the oiling. As to the kind of oil, it is yet, to my mind, an open question. My best results have been with sewing-machine oil. Some of the manufacturers tell you to "use one-half pint of good oil every day in this machine." You can live up to that and still not have your machine properly oiled, and you can get along with one-quarter of that oil and have your machine oiled as it should be. Most machines have a hole or several holes marked "oil here." Oil in those places, of course. One of these holes is always in the crank case. After pouring in a quantity of oil let the drill stand in an upright position for a half a minute or so to let the oil run into the gear case, or whatever mechanism may be in the lower part of the machine, meanwhile turning the chuck so the oil may work into the gearing; then tip the machine upside down and let it stand for another half a minute to let the oil work into the upper part of the machine; now pour out nearly all the oil that will run out of oil hole in the crank case, and if you find you have to pour out too much, put less oil in next day, until you have arrived at exactly the amount required to oil your machine thoroughly and leave a little in the case for the cranks to dash into the cylinders. No need of putting in a lot more oil than you need and then blow it out through your exhaust. Don't forget the following: pour just a little oil into the hole where your air enters so as to oil the valves. Some people recommend keeping the hammers in an oil bath when not in use. I get excellent results from mine by oiling four times a day with sewing-machine oil, and soaking them in a bath of benzine once a week. Drills should also be cleaned once a week with benzine. Now, the oil you pour out from your machines which, by the way, should be but little, as good oil of the kind described is expensive, you should save and run through a filter, not to be used again in the air tools, but to be used to oil shafting, etc.

In conclusion a few rules:

Until you are sure you have some better lubricant, use sewing-machine oil.

Oil drills once a day.

Oil hammers four times a day.

Clean both once a week with benzine.

Don't let every Tom, Dick and Harry try to repair your machines.

Get the most out of your equipment by having proper brackets and rigs, and when your machines and hose are not in use have them so anyone requiring them will know where to get them, and have them brought to this keeping place every night so that the man appointed to

oil them will have his work done before the machines are needed for use in the morning.

You will find yourself amply repaid for any little trouble you may be put to, to organize some method of care and use of these valuable tools.

Holding Work on Parallels on the Magnetic Chuck

By M. H. Anderson

Many toolmakers and other users of the magnetic chuck are under the impression that a piece such as that shown in Fig. 1, which it is necessary to rest upon parallels, cannot be held by the regular magnetic chuck. Such an impression is a mistaken one, because practically any piece of iron or steel that will lie on the parallels may be held by the magnetism of the chuck. It all depends upon where you locate the parallels. A brief examination of the principles underlying the action of a magnetic chuck will help us understand where the parallels should be placed.

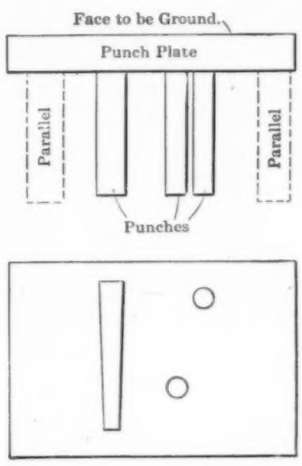


Fig. 1. Work Requiring Parallel Strips

Principle of Magnetic Chuck

A magnetic chuck is exactly the same in principle as the simpler horseshoe magnet shown in Fig. 3. As most of us know, the horseshoe, or any other shape of magnet, has two poles, called north and south. These are shown at *N* and *S*, Figs. 3, 4 and 5. The lines *B*, Fig. 3, show where most of the magnetism lies in a magnet whose poles are close together, as in the horseshoe. These lines can be very strikingly shown by means of some iron filings and a piece of card held over the magnet. It is by getting these lines to pass through the work that the work is held to the magnet.

Suppose we place a piece of iron (a parallel) across from one pole to the other, as shown at Fig. 4. Then the lines will pass through the parallel and it is held to the magnet. If we now place a piece of iron or steel *C* on top of the parallel, Fig. 4, we shall feel scarcely any pull at all. This may be explained as being because the bulk of the magnetic flux passes through the parallel; none of it reaching *C*. If the parallel is very thin and the magnetism strong, then enough "lines" would pass through *C* so that it would be held; but this is supposing an extreme case.

Proper Position for Parallels

How, then, shall we get the lines to pass through a piece such as that shown in Fig. 1, which must be laid on parallels? If we place one parallel on *N* and one on *S*, Fig. 5, we shall find a similar pole is induced at the face of each parallel that is farthest from the magnet; that is, we shall virtually lengthen the prongs of the magnet so that the poles are now at N_1 and S_1. The work can be laid on these and securely held, the intervening space above the chuck accommodating any projection on the work, which has prevented using the chuck in the ordinary way.

Looking now at Fig. 2, we see a plan of a well known chuck face, in which the shape of the poles is of an intermeshing character, giving a more convenient distribution of the magnetic flux than is found in its simpler prototype, Fig. 3. I have shaded one pole so as to make it more easily distinguishable from the opposite one. There usually is a layer of nonmagnetic substance between the adjoining sides of the opposite poles. If we place two parallels as at *A A*, Fig. 2, the lines of magnetism will pass through them from the tongue of one polarity to the nearest tongue of opposite kind, as simply shown in Fig. 4. That is, the two parallels placed as *A A*, are already bridging the two poles and have no attraction for anything placed upon them. No doubt this is where some toolmakers and machinists have obtained the idea that work cannot be magnetically held on parallels.

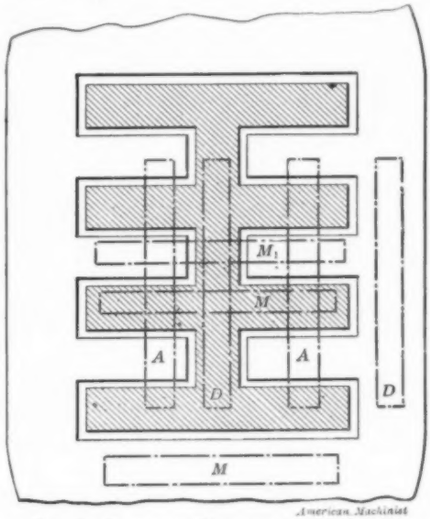


Fig. 2. Placing Parallels on the Magnetic Chuck

Application to Commercial Chuck

As we saw in Fig. 5, what is required to enable the chuck to hold a piece such as Fig. 1, is to place each of as many parallels as are used, wholly on one pole or the other and not touching both. With a chuck face of the form shown in Fig. 2, this can be accomplished by locating the parallels as at *D D*, or *M M*. If they are located as at *M* M_1, so that one bridges from one pole to the other, the power to hold work will be very much weaker, though not so low as if placed as *A A*. It may be added that the softer the iron or steel used for these parallels, the better they will serve.

It is not necessary to explain how parallels should be placed for other forms of chuck face. The object of this explanation is attained if the principle underlying this matter is made clear.

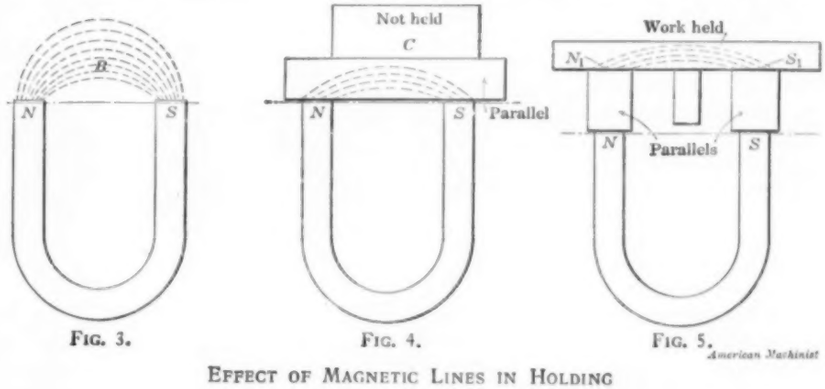


Fig. 3. Fig. 4. Fig. 5.

Effect of Magnetic Lines in Holding

Steel Used in Automobile Manufacture—Correction

In an article on Materials Used in Motor Cars, published on page 738, first line of the first column it was stated that for propeller shafts type K steel, made by the United States Steel Company, was used, whereas the maker of the particular brand of steel mentioned is the United Steel Company, of Canton, Ohio.

Subpress Die Posts

By A. C. Lindholm

In almost all manufacturing concerns where modern methods are in vogue, especially where accurate press work, such as is used in adding machines, typewriters and instruments of precision, is required, the subpress die is speedily asserting itself as the correct design in maintaining quality of product and economy in upkeep of tools. A noticeable fact is the increasing use of the post or pillar construction over the cylindrical or piston type, due chiefly to its adaptability in blanking, shaving and follow dies, and last, but not least, bending or forming. In the last named, its value is undoubtedly recognized, due to the interchangeability of the product from one lot to another, the work always remaining the same and always set and ready for use; besides the trials and troubles of the press man in producing work to gage are eliminated.

Of the many various types and designs of the subpress die, the main principle is about the same, that is, alinement, whether it is of a two- or four-post design, and this article merely describes the different ideas used in various establishments in regards to the construction of the posts and their bearings.

In Figs. 1 to 6 inclusive, I endeavor to illustrate the different methods used, which no doubt will be familiar to many readers with experience in this line.

Fig. 1 is the simplest design and the method in machining is as follows:

The upper and lower members are clamped together and a hole large enough to admit a suitable boring bar is drilled. The frame is then placed on a lathe or milling machine and bored as smooth as possible. Some establishments use a long hand reamer to finish to size and to obtain a smooth cut. The post is generally made from machine steel and an oil groove cut on the end that slides in the upper member. The post is hardened and ground, leaving the short end *a* large enough to obtain a drive fit. In assembling, the post is entered into the lower member from the bottom, so that when the large end enters there will be no tendency to crowd over to one side and shear the hole.

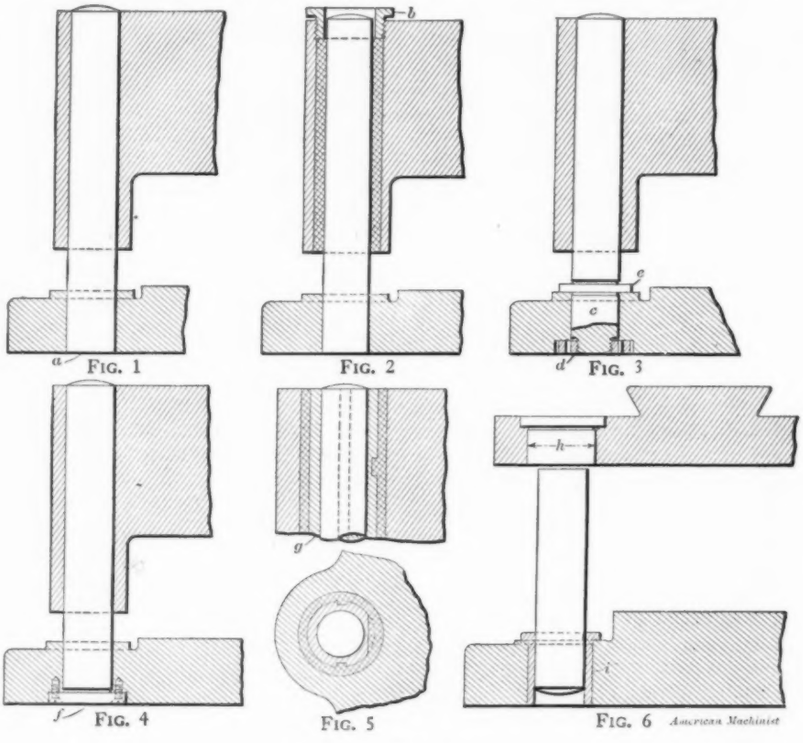
In Fig. 2 the post is the same as in Fig. 1, excepting the oil grooves, which are cut in the babbitt bearing, as will be seen by referring to sketch. The hole is bored taper (on a lathe) and threaded for the adjusting nut *b*, used to take up on the babbitt sleeve in case of wear.

This method may appeal to some designers, but if cost is taken into consideration, the design in Fig. 1 is preferable and equally efficient. The wear on the cast iron is very little and if the post is lapped smooth, a good free action is obtained.

Fig. 3 is similar to Fig. 1 in design, excepting the shoulder and nut for the threaded end of the post. The idea is to be able to remove the post when desired; hence, the end *c* is not a driving fit. The nut *d* holds the post securely in place. Although there is one disadvantage, there is also an advantage in being able to remove the post, and that is the accessibility when grinding the punch or die on the bottom member as the case may be. The disadvantage is the liability to assemble it after grinding in such a manner as to get foreign substances, chips, dirt, etc., under the shoulder *e*, thereby straining the post when tightening the nut and throwing the long end out of line.

The groove or keyways are cast in as per sketch (although this feature is not essential). The bottom member is machined, the posts inserted square with the base, the bushings placed on the posts and the upper member placed over these, leaving the space equally divided for the babbitt to be poured in. The outside of the bushing being rough and the inside of the covered hole being also rough, prevents the metal from becoming loose or turning. Grooves can be cut in the post as described in Fig. 1. The cost of making is low in comparison with other designs and the efficiency obtained is equal to any of the designs described.

Fig. 6 is a type of subpress used mostly in bending dies and differs somewhat in design in regard to placing the post in the upper member. In operation,



SUBPRESS DIE POSTS

Fig. 4 is another idea similar to Fig. 3, the object being to be able to remove post. It is essential, however, to have a good bed plate under the end *f* so that if the post should stick for any reason there would be something solid to back it up. Although the post is cheaper to make, there is no decided advantage in its use in comparison with Fig. 3.

Fig. 5 is an interesting type and, as it is well known, the expensive part of making the sub-die frames is the machining of the holes to acquire the proper alinement. To eliminate this operation, in the upper member especially, the holes are covered and a sleeve *g* is bored and reamed in the lathe to proper size. The outside diameter is left rough, it is essential to provide a bolster plate with holes for clearance for the posts when descending. In machining, the members are clamped as described for Fig. 1, and the hole bored suitable for the outside diameter *i* of bushing equal to *h* of the post. The bushing is generally made from tool steel hardened and ground.

This design is adapted to a wide range of work and presses of long stroke. Of course, it is necessary to have a good press, as can be seen by the method used in clamping the punch holder to the ram, but the one essential feature is embodied in the construction, and that is the punch and die are one unit and always set to produce interchangeable work.

Increasing Shop Capacities

METAL WORKING

NEW ENGLAND

The Howe Scale Company will build a new foundry at Rutland, Vt.

The Hodgdon Brass Works, of Boston, Mass., was partly destroyed by fire.

The Office Applicance Company, 15 State street, Boston, will purchase an engine lathe.

T. C. Bowditch will build a new garage on Pleasant street, Boston, Mass., to cost $10,000.

Brown Brothers Company, Gloucester, Mass., operating garage and machine shop, will make an addition.

The Meisel Press and Manufacturing Company is making additions to its factory at Dorchester, Mass.

Manning, Bowman & Co., Meriden, Conn., manufacturers of coffee percolators and specialties, are erecting a brick addition to their plant.

J. W. Dorley, Gloucester, Mass., will open a garage and machine shop in the old plant of the N. Richardson & Son Manufacturing Company.

The Dorsh Manufacturing Company, Bridgeport, Conn., manufacturer of special hardware, is to erect a one-story and basement building on Third street.

The Charles Parker Company, Meriden, Conn., manufacturer of guns, hardware and metal specialties, is to erect a new spelter foundry to its Elm Street plant.

The Norton Grinding Company, Worcester, Mass., has commenced work on third wing to machine shop; also, another building which will contain drawing room and laboratory.

The new factory at Providence, R. I., of the F. Speidel Company, will soon be occupied. The firm has its American office at 71 Nassau street, New York. Chains will be manufactured.

The Bridgeport (Conn.) Screw Company has filed articles of incorporation ,capital $350,000. Incorporators, W. J. Farrell, Fred Enos, etc. Office has been opened in the Newfield building.

J. J. Adams, boot and shoe machinery and die manufacturer, of Worcester, Mass., contemplates erection of a five-story manufacturing building on site of present factory on Mechanic's street.

The George L. Brown Company, Providence, R. I., has been incorporated with $60,000 capital to manufacture jewelry. Incorporators, George L. Brown, of Attleboro, H. J. Humphrey, Thomas F. Sexton, Providence.

The Hamilton Aviation Company, New Britain, Conn, has been incorporated with $25,000 to build and operate airships. Incorporators are C. K. Hamilton, J. L. Hamilton, N. M. Baudette and T. W. O'Connor.

The Gewals Electric Manufacturing Company, Hartford, Conn., has been incorporated with $50,000 to manufacture electrical specialties. Incorporators, M. I. Smith, E. Raymond Low and Robert Smith, of Hartford.

The Sachs Laboratories, Incorporated, Hartford, Conn., has been incorporated with $50,000 capital to manufacture electrical and chemical appliances. Incorporators are Joseph Sachs, B. Hanson, Charles Rice and F. N. Nichols, of Hartford, and C. F. L. Robinson, of New Haven.

News items for the sales department — where more equipment will be needed. Authentic news is solicited for this department, not rumors or gossip — facts

MIDDLE STATES

The Keystone Tube Works, Connellsville, Penn., will enlarge its plant.

The Acorn Brass Manufacturing Company, Chicago, Ill., will enlarge its plant.

The Union Cutlery Company, Olean, N. Y., is erecting two additional buildings.

The Writerpress Company, Buffalo, N. Y., will move its plant to Shelton, Conn.

The Crescent Tool Company, Jamestown, N. Y., will build a two-story addition.

The Kerr Turbine Company, Wellsville, N. Y., will erect a one-story addition.

W. M. Jenkins will build a garage at 1241 Beechwood boulevard, Pittsburg, Penn.

G. A. Rutnipf is having a garage erected at 64 West Tulpehocken street, Philadelphia, Penn.

The Standard Steel Box Company, Bridgeville, Penn., has let contract for a $12,000 factory.

A garage will be built for E. F. Guthrie, at Forbes street and Denniston avenue, Pittsburg, Penn.

The Marshfield (Wis.) Stove Company will build a plant to take the place of one recently burned.

W. F. Furst is having a garage erected at Sixty-third and Lancaster avenues, Philadelphia, Penn.

The Steel Casting Company, Cincinnati, O., has secured permit to erect new $12,000 factory building.

The J. H. Voscamp estate will build a brick garage at Wylie avenue and Devilliers street, Pittsburg, Penn.

The Hannifin Manufacturing Company, Chicago, Ill., manufacturing brass tools, will install new equipment.

The Shepard Electric Crane and Hoist Company, Montour Falls, N. Y., will build an addition to its plant.

A permit has been granted to S. A. Dickie to build a garage at 1759 Beechwood boulevard, Pittsburg, Penn.

G. A. Seefeld is having a foundry built on Milwaukee street between Chicago and Menominee, Milwaukee, Wis.

The Seashore Machine Works, Atlantic City, N. J., has built a large addition to its machine department.

The Eble Machine and Specialty Works, Atlantic City, N. J., has filed plans for an uptodate machine shop.

M. C. Bard, Millville, N .J., has just completed a building for the manufacturing of gas and gasolene engines.

Hayes Pump and Planter Company, Galva, Ill., has commenced work on a foundry plant. Machinery will be purchased.

The Johnston Harvester Company, Batavia, N. Y., will build an addition to its plant, doubling present capacity.

The Johnson-Vlaanderen Machine Company, Paterson, N. J., has purchased site on which a five-story plant will be eretced.

Fire destroyed the plant of the Homer Brass Company, Water and Mifflin streets, Philadelphia, Penn. Loss, $20,000.

The Loveland Gas Engine Company, Bridgeton, N. J., is erecting a new plant. Will be in the market for new machinery.

The Philadelphia Coppersmithing Company will erect a factory building at 222 to 226 North Front street, Philadelphia, Penn.

The Newark (N. J.) Gear Cutting Machine Company is erecting a one-story addition to be used chiefly for assembling purposes.

The Kernschen Improved Ventilator Company, Chicago, Ill., has changed its name to the Kernschen Company. Will enlarge its plant.

The National Machine Company, Milwaukee, Wis., will take bids for erection of a two-story machine shop on National avenue near Tenth.

The roundhouse and other buildings of the South Dakota Central Railroad Company, at Sioux Falls, S. D., were destroyed by a fire. Loss, $50,000.

The Casimir Von Philip, Bridgeton, N. J., have located in the Commercial League building, Bridgeton, N. J., and will manufacture printing presses.

The C. H. A. Dissinger & Brother Company, of Wrightsville, Penn., is moving its plant to Lancaster. The concern builds gas and gasolene engines.

Chicago, Rock Island & Peoria Railway Company will move its car-repair shops from Davenport, Ia., to Silvis, Ill. Address, W. S. Tinsman, general manager, LaSalle Street depot, Chicago, Ill.

G. B. Crisman, contractor, will build for Mrs. Marie Stewart, a garage and repair shop at Neville street and Ellsworth avenue, Pittsburg, Penn.

South Jersey Yacht Building Company, Atlantic City, N. J., have just completed building a large plant for the manufacturing of high-speed motors for boats.

Permit has been granted for a one-story factory building on Wyandott street, Dayton, O., which will give additional space to the Buckeye Iron and Brass Works.

The Hill-Hawkins Boiler and Tank Company, Chicago, Ill., has been incorporated. Capital, $25,000. Incorporators, W. D. Hawkins, J. E. Chisholm, J. Delahanty.

The Canton Steel Foundry Company, Canton, Ohio, has been organized to manufacture all kinds of metallic articles by John T. Blake, Bessie Buroway, Ed. L. Smith, etc.

The International Aëroplane Manufacturing Company, Chicago, Ill., has been organized to build aëroplanes, etc., by Samuel D. Dixon, Arthur Sanderson, Wm. E. Johnson.

The Arbogast Aero Company, Anderson, Ind., has been incorporated with a capital of $10,000 by Ernest W., Daniel and John R. Arbogast, to manufacture air craft.

Price Auto Works, Chicago, Ill., has been incorporated to manufacture auto trucks, automobiles. Capital, $20,000. Incorporators, Arthur C. Price, S. E. Price, Geo. Walker.

The Standard Sad Iron Company, Mansfield, Ohio, has been organized to manufacture sad irons. Incorporators, Fred D. Stolter, Geo. W. Nagle, L. E. Hetler, etc. Capital, $20,000.

The Bogardus Company, Chicago, Ill., has been incorporated to manufacture engines, boilers, tools. Capital, $50,000. Incorporators, W. L. Barnum, Thos. A. Nelson, etc.

The Circle Motor Car Company, New York, has been incorporated to manufacture motor vehicles, etc. Capital, $25,000. Incorporators, J. M. Boyle, J. W. Boyle, E. M. Boyle.

The Hydraulic Pressed Steel Company, Cleveland, Ohio, will erect a four-story building which will cost, with its equipment, over $100,000. A. W. Ellenberger is president of the firm.

M. E. Reppenhagen, Inc., Highland Falls, N. Y., has been incorporated to manufacture razors, cutlery, etc. Capital, $60,000. Incorporators, J. F. Connolly, L. C. Schoepf, L. D. Stewart.

The Atlas Special Machine Company, Chicago, Ill., has been incorporated with $20,000 capital to manufacture machinery and appliances. Incorporators, W. J. Head, Geo. Weiss, R. I. Woodman.

The Central Railroad of New Jersey, whose cars at Elizabeth recently burned, proposes to build new shops near its present locomotive shops. Main offices are 143 Liberty street, New York.

The Navy Department, Bureau of Supplies and Accounts, Washington, D. C., will open bids June 6, for one boring, drilling and milling machine for the Mare Island navy yard, as per Schedule 3541.

The Russell Windstacker Company, Indianapolis, Ind., has been incorporated with a capital of $100,000, by H. A. Russell, L. A. Hardin and E. V. Secord, to manufacture agricultural machinery.

The Automatic Machinery Company, Indianapolis, Ind., has been incorporated with a capital of $10,000 by John Gaynor, Clifford Remler and Edward Miller, to manufacture bottle-making machinery.

Work will be commenced at an early date on the erection of a large four-story factory building for G. H. & F. H. Lippincott, Inc., Philadelphia, Penn., manufacturer of soda fountains, to cost $250,000.

The International Postal Supply Company, 150 Nassau street, New York, making letter stamping machines, etc., has purchased site at 634 Prospect place, Brooklyn, N. Y., and will erect a two-story factory.

The Plumbers' Fixture Manufacturing Company, of Cleveland, Ohio, has been incorporated for $10,000 to manufacture plumbing supplies. Incorporators, W. H. Dettleback, W. J. Bergens and O. P. Strong.

The F. M. L. Company, Dayton, Ohio, has been incorporated to manufacture electrical appliances for dentists and physicians. Capital, $10,000. Incorporators, E. R. Tizzard, P. A. McCray, R. R. Renick, etc.

The Rochester Sprayer Company, Rochester, N. Y., has been incorporated to manufacture sprayers, farm and garden implements. Capital, $50,000. Incorporators, F. O. Blake, W. Young, Cortland, O. C. Wolcott, Rochester.

The Olympia Manufacturing and Service Company, Jersey City, N. J., has been incorporated to manufacture automobiles, etc. Capital, $100,000. Incorporators, Robert S. Segelken, Henry Schmidt, Robert Segelken, Jr.

The West Lake-European Machine Company, Toledo, Ohio, has been incorporated with $10,000 capital to manufacture and sell automatic machinery of all kinds by E. J. Marshall, Geo. E. Dixon, B. L. Longnecker, etc.

The O'Donnell Elevator and Machine Company, Cleveland, Ohio, has been incorporated to manufacture and sell elevators and elevator equipment, by J. P. O'Donnell, G. Brandenburg, John E. Nygren, etc. Capital, $20,000.

The International Lock-Nut Company, New York, has been incorporated to manufacture nut locks, bolts, nuts, etc. Capital, $100,000. Incorporators, J. Donahue, Flushing; J. H. Wiegand, Portchester, N. Y.; C. C. Field, Brooklyn.

The Hubbs Razor and Manufacturing Company, Newark, N. J., has been incorporated to manufacture safety razors, etc. Capital, $50,000. Incorporators, Chas. A. Hubbs, Brooklyn, N. Y.; Frank H. Kelley, T. M. Manning, Newark.

The Computing Recorder Company, Rochester, N. Y., has been incorporated to manufacture computing and recording machines. Capital, $30,000. Incorporators, M. C. Hammond, Coldwater; P. V. C. Jackson, E. Van Duser, Rochester.

The Washington (Penn.) Tinplate Company, of which J. J. O'Conner, of Pittsburg, is president, has begun improvements to the plant to cost about $75,000. The changes include new machinery and a remodeling of the principal mill.

The Merkel Brothers Company, Cincinnati, Ohio, has been incorporated with $300,000 capital to manufacture and sell plumbers' supplies, sanitary supplies and steam-fitting supplies, by Laura M. Merkel, Albert A. Merkel, Louis J. Merkel, etc.

The Dayton Engineering Laboratories Company, Dayton, Ohio, incorporated for $250,000, will locate a plant on corner First and Foundry streets, Dayton, to manufacture all kinds of auto specialties. It will begin operations about January 1, 1912, and F. P. Beaver, a Dayton capitalist, is erecting a large power building for the use of this plant.

SOUTHERN STATES

The Morgantown & Kingwood Railroad Company, Morgantown, W. Va., is asking for bids for its new shops.

The St. Louis (Mo.) Automobile and Engine Company has been incorporated by W. D. Williams to manufacture rotary steam engines. Capital, $50,000.

It is reported that John C. Haswell, president of the Marion (Ind.) Malleable Iron Works, is interested in a malleable iron plant to be located in Louisville, Ky.

Fire damaged car repair and blacksmith shops of the Tennessee, Alabama & Georgia Railroad, at Alton Park, Tenn. It is said the company contemplates re-establishing shops on a larger scale.

The Baltimore (Md.) Gas Appliance and Manufacturing Company has prepared a list of machinery and equipment needed for the new plant at Bayard and Nanticoke streets; H. W. Hunter is president.

WEST OF THE MISSISSIPPI

A. A. Koch, of Albert Lea, Minn., expects to build a foundry.

J. C. Kirkpatrick is building a blacksmith shop at Athelstan, Ia.

Hanson Brothers, of Walnut, Ia., will erect a garage and blacksmith shop.

Headford Brothers, of Waterloo, Iowa, will erect an addition to their foundry this fall.

H. O. Peck, Portland, Ore., is having plans prepared for a commercial garage. Modern machinery will be installed.

H. C. Keedy, Spokane, Wash., will build a commercial garage and repair shop. Modern equipment will be installed.

The Webster City (Ia.) Brick and Tile Company will build a large machine shop in connection with its plant.

J. W. Osborne, Spokane, Wash., will build a commercial garage and repair shop. Modern equipment will be installed.

The American Steel and Wire Company has taken out a permit to make improvements in its manufacturing plant at San Francisco, Cal.

Chester E. Striffler, Alhambra, Cal., is having plans prepared for a commercial garage and repair shop. The plant will be fully equipped.

The building for the new Meredith Garage, Salt Lake City, Utah, is nearing completion. The plant will be equipped with modern machinery for repairs, etc.

The Atlas Steel Company, Dunkirk, N. Y., has made application to the Long Beach (Cal.) Chamber of Commerce for a site for a plant in this vicinity.

The George H. Tay Company, San Francisco and Los Angeles, Cal., manufacturers of plumbing specialties, has acquired property on East Eighth street, Los Angeles, and will build a new plant.

The Oregon Trunk Line will build engine and car shops, wood-working and machine shops, and a large roundhouse at Metolius, Ore., in the near future. This new town is to be the chief division point of the road.

Harry G. Howard, Sacramento, Cal., is at the head of a project to build a factory for the manufacture of a patented fiber textile machine. The plant is estimated to cost, with a power plant for operation, $350,000.

CANADA

The Medicine Hat Nail Works will build a new factory there.

The Anthes Foundry Company will build a big new plant in Winnipeg.

Fire partly destroyed the Brantford (Ont.) Screw Works. Will be rebuilt.

The George White Engine Company will extend its plant at London, Ont.

The Imperial Garage Company will equip a $30,000 plant at Windsor, Ont.

Austin & Hurst, Burnaby, B. C., will establish an ornamental iron-working plant.

Messrs. W. J. Reid & Sons will locate a large new automobile factory at London, Ont.

Fire caused $150,000 loss in the machine shops of the Canadian Car and Foundry Companys shops at Amherst, N. S. Will be rebuilt.

GENERAL MANUFACTURING

NEW ENGLAND

Northampton, Mass., will build a new power house.

South Hadley, Mass., will build a new pumping station.

The Eagle Dye Works, Pawtucket, R. I., will install new boilers.

Amesbury, Mass., will spend $12,000 on improving its water system.

L. B. Evans & Co., of Wakefield, Mass., will build a five-story shoe factory.

The American Knitting Company, Waltham, Mass., is adding a two-story building.

The Doane & Williams Company will erect a three-story factory at Holyoke, Mass.

Waterbury, Conn., will build a new reservoir. Pumps and engine will be needed.

The Saco Valley Canning Company will erect a corn-packing plant at Belfast, Me.

The Pioneer Braid Company, of Meriden, Conn., will move its plant to New York city.

The Hunt-Rankin Leather Company, Peabody, Mass., will erect a four-story addition.

The sawmill of Hume & Newhall, Fairfield, Me., was destroyed by fire. Loss, $150,000.

The K. Manufacturing Company, 165 Somerset street, Providence, R. I., will install a boiler.

The Whitman Molding Company, Whitman, Mass., is in the market for wood-working machinery.

Charles F. Stone has taken out a permit for alterations for knitting factory at Waltham, Mass.

The Drew Machinery Company, Concord, N. H., is in the market for dry kiln-heating outfits.

The Smith Paper Company, of Lee, Mass., contemplates equipping its five mills for electric operation.

Hill & Cutler, a Boston (Mass.) firm, is to have a large waste mill erected in New Bedford, Mass.

The Granite Railway Company, Granite Quarries, Milton, Mass., will add a 3000-foot air compressor.

The United States Government will purchase a small locomotive for the Portsmouth, N. H., navy yard.

The Lynn (Mass.) Grease Extracting Company will erect a new plant, also add new boilers and engines.

The Mattatuck Manufacturing Company, Waterbury, Conn., is to build a new structure for its power plant.

The Barker mill, Orono, Me., operated by the International Paper Company, was badly damaged by fire. Loss, $10,000.

The Danvers Bleachery, Peabody, Mass., will install a new centrifugal pump at its artesian well, to be operated by motor.

The Central Wharf Cold Storage Company, of Portland, Me., is remodeling its plant at Central Wharf. A new boiler house will be built.

Kafka & Co., Waterbury, Conn., cigar and tobacco manufacturers, are erecting a four-story factory building at Meadow and Prout streets.

The old Ross Mill, East Killingly, Conn., is to be operated by the International Cotton Company. Modern equipment will be installed.

Vanderhoef & Co., South Norwalk, Conn., fanufacturers of hatting straw braids, are to erect a three-story addition to their Butler Street plant.

The plant of the American Fruit and Chemical Company, Providence, R. I., was destroyed by fire. Manufacturer of soaps, washing powders and preserves.

W. Hawthorne, Waterbury, Conn., whose wood-working plant was destroyed by fire some time ago is to erect a four-story factory building on the same site.

A. E. Little & Co., shoe manufacturers, of Lynn, Mass., will open a new factory in Brockton, Mass., in building formerly occupied by Stacy-Adams Company.

The Narraganset Electric Lighting Company, Providence, R. I., has purchased 62,000 square feet of land which will be used in the future for extension of present plant.

The International Cotton Company, Killingly, Conn., is to operate the old Ross mill at East Killingly. Will install new equipment and increase capacity of power plant.

The Deane Steam Pump Company, Holyoke, Mass., will be in the market for a new power-plant equipment of about 450 kilowatts capacity. Will consider oil, gas and steam plants.

MIDDLE STATES

The Battle Creek (Mich.) Paper Company is erecting an addition.

Swift & Co., Cincinnati, Ohio, will build a large cold-storage plant.

Fire destroyed the box factory of Ralph Ferguson, Passaic, N. J.

The Bradley Institute, Peoria, Ill., will erect a $65,000 power plant.

The Michigan Carton Company, Battle Creek, Mich., will erect a new mill.

The East Moline (Ill.) Sash and Door Works will move into a larger plant.

Fire destroyed the plant of the Buffalo (N. Y.) Glass Company. Loss $250,000.

The Abraham Cox Stove Company, Philadelphia, Penn., will build a new boiler room.

The Bridgeton (N. J.) Condensed Milk Company is building a large addition to its plant.

The Summerdale Dye Works, of Holmesburg, Penn., is having a boiler house erected.

Williams Brothers will move their last block factory from Manton, Mich., to Cadillac.

The Zelienople Flour Mill, of Zelienople, Penn., was damaged by fire. Loss, $25,000.

An addition is to be erected to the plant of the Lake View Malt Company, Buffalo, N. Y.

Jamestown, N. Y., is considering the erection of a 5,000,000-gallon water-storage reservoir.

The West Penn Railways Company is preparing to extend its plant at Connellsville, Penn.

The Rhinelander (Wis.) Paper Company has awarded contract for a $150,000 addition to its plant.

The plant of the New York Piano Key Company at Middletown, N. Y., was burned. Loss, $125,000.

Fire damaged the plant of the Union Bag and Paper Company, at Hudson Falls, N. Y. Loss, $200,000.

The Standard Sanitary Company, New Brighton, Penn., making bath tubs, etc., is erecting a seven-story addition.

Pumping station for lake water, Cleveland, Ohio, will be overhauled; $200,000 will be expended. Address A. B. Lee.

Freeport Carriage Company, Freeport, Ill., has commenced work on a paint-grinding building as an addition to its plant.

The Dostal Brothers brewery will soon construct a new engine house and storage room, and new machinery will be installed.

The Pennsylvania Globe Gas Light Company is building an addition at Ninth street and Sedgely avenue, Philadelphia, Penn.

M. A. Metz, manufacturer of knit goods, is having a five-story factory built at Sixth and Spring Garden street, Philadelphia.

The Beaver County Light Company, New Brighton, Penn., is planning to install some new equipment. Will add five rectifiers.

F. W. Tunnel & Co., Chester, Penn., manufacturers of glue and fertilizer, have purchased a site for a plant at Marcus Hook.

The Grasselli Chemical Company, of Cleveland, Ohio, will erect a plant in Canton, Ohio, to be used in the manufacture of chemicals.

Estimates have been asked for a new factory building at Fort Washington, Penn., for the Organic Chemical Manufacturing Company.

The Electric Storage Battery Company will build an addition to its plant at Nineteenth street and Allegheny avenue, Philadelphia, Penn.

Centerfreeze Ice Manufacturing Company, Baltic and New York avenues, Atlantic City, N. J., is building a large addition to its plant.

The Woods Product Company, of Buffalo, N. Y., will build a $25,000 factory building to replace the part of its plant recently burned.

The S. S. White Dental Manufacturing Company, Philadelphia, Penn., has purchased a site on which an extension to its plant will be built.

Fire destroyed the old building of Arbuckle Brothers, sugar refinery at John and Jay streets, Brooklyn, N. Y., causing a loss of $500,000.

The Navy Department, Bureau of Supplies and Accounts, Washington, D. C., will open bids May 16, for 20 pneumatic chipping hammers as per Schedule 3534.

Plans have been prepared for the erection of an ice-manufacturing plant, at Norwalk, Ohio, by Edward Kerber, former president of the Inter-State Ice Company.

J. Randall & Brother, Trenton, N. J., have incorporated with $75,000 capital to manufacture silk, etc. Incorporators, Wm. E. Rue, Theo. K. Kitchin, M. A. Kitchin.

The Navy Department, Bureau of Supplies and Accounts, Washington, D. C., will open bids May 23, for molding machine, rod and dowel machine, shaping machine (schedule 3540).

The Piqua Ice Company, Piqua, Ohio, has been incorporated with a capital of $20,000 to manufacture and sell ice by L. R. Hager, Dora P. Hager, Sally R. Hager, Wm. Raser, Thos. E. Ginn.

George B. Fulton, receiver for the North Baltimore Match Company, has sold the property to Samuel Cunningham, of Wadsworth, Ohio, who proposes to place the plant in condition for operation.

The National Clay Products Comapny, Rising Sun, Ohio, has been organized to manufacture and sell tile, brick and other clay produces, by E. L. McCroy, C. H. Sankey, H. W. Helle, etc. Capital, $50,000.

The capital stock of the Northern Ohio Traction and Light Company, of Akron, Ohio, has been increased from $10,000,000 to $13,000,000 for the purpose of making extensions and additions to its plant in Akron.

The Navy Department, Bureau of Supplies and Accounts, Washington, D. C., will open bids May 16, for steel castings, cold-drawn steel, hot-rolled or forged steel, machine steel, nickel steel, plate steel (schedule 3530).

A refrigeration plant will be installed in the new market building to be erected at Cleveland, Ohio, by Goakes & Dettlebach. Knox & Elliott, of Cleveland, Ohio, are preparing plans. Estimated cost, $200,000.

The Richmond Lamp Manufacturing Company, Richmond, Ind., has been incorporated with a capital of $50,000 by J. M. Judson, J. C. Ingram and F. W. Judson, to manufacture automobile, carriage and other lamps.

The Pauling Cement Products Company, Paulding, Ohio, a new partnership concern, has taken over the old Nutter & Spellmeyer elevator at that point, and will engage in the manufacture of cement blocks, brick and tile.

The Isthmian Canal Commission, Washington, D. C., will receive bids up to 10:30 a.m., May 26, for supplies for year ending June 30, 1912, including hand cars, push cars, wheelbarrows, wrenches, nails, hack-saw blades, hose clamps, etc., as per Schedule 630.

Power-plant equipment will be required for the 12-story hotel to be erected at East Sixth and Lakeside avenues, Cleveland, Ohio. W. L. Stener, of Cleveland, Ohio, is representing the Mills estate, of New York, which is backing the venture. About $1,500,000 will be expended.

Plans for the construction of not only a third but a fourth dam and another power house are being prepared by the La Crosse

(Wis.) Water Power Company. It is estimated that the construction of the fourth dam and second power house will involve an expense of approximately $500,000.

The Navy Department, Bureau of Supplies and Accounts, Washington, D. C., will open bids May 16, for 40 crucibles (schedule 3538), four 10-horsepower motors (schedule 3531), hacksaw blades, steel bolts and nuts, worm-geared chain blocks, differential blocks, steel rivets, hand tools, steel wheelbarrows (schedule 3534).

SOUTHERN STATES

The Hetrick Hosiery Mills will build a plant at Spartanburg, S. C.

The Springfield (Tenn.) Woolen Mill Company will build an addition.

The Emporia (Va.) Land and Lumber Company will erect a veneering plant.

A bond issue of $40,000 is contemplated by the town of Arcadia, Fla., for waterworks, etc.

The Mountain Window Glass Company will move its plant from Condersport, Penn., to Clarksburg, W. Va.

The Clarksburg (W. Va.) Planing Mill Company is making arrangements to rebuild its plant recently burned.

Plans have been completed for power house for the Springfield State Hospital for the Insane at Sykesville, Md.

The Walbrook Lumber and Manufacturing Company, Baltimore, Md., will build a big addition to its plant on Clifton avenue.

The Cherokee Furniture Company is being formed at Rome, Ga., by J. McD. Veal, formerly of the Rome Furniture Company, and J. N. Mays.

WEST OF THE MISSISSIPPI

E. B. Keplinger, of Bainville, Mont., will erect a carpenter shop.

The Stanadrd Oil Company will build a new station at Centralia, Wash.

The city of Drain, Ore., will install a waterworks system. Bonds have been voted.

The Mission Building Company, Porterville, Cal., will build a new planing mill.

The Frecar-Brin Furniture Company, Wichita Falls, Tex., is erecting a new factory.

The Grafton Stave and Heading Company, Pocahontas, Ark., is erecting a new plant.

The J. W. Fales Paper Company, Seattle, Wash., will build an addition to its plant.

The Everett Gas Company, Everett, Wash., will build a new substation at Monroe, Wash.

E. A. Sims, Port Townsend, Wash., is making improvements in his fish-canning plant.

The Austin (Minn.) Gas Company will enlarge its plant and install uptodate machinery.

The Winters Canning Company (fruit), Suisun, Cal., is contemplating an addition to its plant.

L. C. Drummond, Boise, Idaho, is planning to build a sash and door factory at Portland, Ore.

The Bend (Ore.) Brick and Tile Company will install a new pumping plant in the near future.

The sawmill of the Donald Lumber Company, at Banks, near Forest Grove, Ore., was destroyed by fire.

The Cornell Creamery Association, C. H. Ramsey, secretary, Henriette, Minn., will erect a creamery.

T. J. Walker and C. W. Haley, Portland, Ore., will establish a sash and door factory at Centralia, Wash.

The Lake Union Brick Company, Seattle, Wash., will build an addition to its brick-manufacturing plant.

The Valley Development Company, Chehalis, Wash., will build a 100,000-horsepower power plant near Lewis.

The Snively-Helms Flouring Milling Company, Kennewick, Wash., has commenced the erection of a large mill.

The Payette (Idaho) Cold Storage Company, will build a new cold-storage plant. Estimated cost $50,000.

O. B. Allen, Yreka, Cal., is planning to establish a printing plant at Weed. Modern equipment will be installed.

The Norwood Lumber Company, Blaine, Wash., has purchased property and will build an addition to its sawmill.

The Spokane Lumber Company, Newport, Wash., will build a new sawmill in this vicinity in the near future.

The city of Oakdale, Cal., is planning to install a waterworks and sewer system. Bonds have been voted for $10,000.

Roach & Chambers, San Jacinto, Cal., will increase the capacity of their power plant. New machinery will be installed.

Joseph Weisel & John Jay, Glazier, Ore., will build a new shingle mill and box factory in this vicinity in the near future.

The Seattle (Wash.) Car Manufacturing Company will increase the capacity of its plant. An addition will be erected.

O. A. Seggett, Garfield, Wash., operating a flour-milling plant, will make extensive improvements and add to its capacity.

Frank M. Coombs, North Bloomfield, Cal., will build a new sawmill at Graniteville. Modern machinery will be installed.

The plant of the Capital box factory, Sacramento, Cal., recently destroyed by fire, will be rebuilt in the immediate future.

The Pacific Power and Light Company, Portland, Ore., is having plans prepared for a new substation at Toppenish, Wash.

The Treasure Mining Company, near Silver City, N. M., is planning to install a 1500-horsepower hydroelectric power plant.

The Central Cotton Oil Company, Jackson, Miss., is in the market for second-hand 220-volt generator, 100 to 150 horsepower.

The woodworking plant of the Westbrook Manufacturing Company, Jackson, Miss., recently destroyed by fire, is to be rebuilt.

The Baker County Lumber Company, near American, Ore., is planning for the erection of a planing-mill addition to its plant.

The La Grande Creamery Company, Portland, Ore., has taken out a permit to make improvements in its cold-storage plant.

Burke & Daggett, Spokane, Wash., will install a pumping plant and irrigation system on a 160-acre tract in this section.

The North Alaska Salmon Company, Bristol Bay, Alaska, is planning to establish a new canning plant in the near future.

The city of Oxnard, Cal., is planning to establish a waterworks system. The city engineer is engaged in estimating the cost.

N. Remensberger, Folsom street, San Francisco, Cal., has taken out a permit to make improvements in his bottling-works plant.

The Metropolitan Printing Company, Portland, Ore., has taken out a permit to make improvemenes and additions in its plant.

The Portland (Ore.) Railway, Light and Power Company has taken out a permit to build a new substation on East Lincoln street.

The Johnstonville (Cal.) Telephone Company will establish a plant and system at Susanville, where a franchise has been asked.

Leo Steinert, of Red Lake Falls, Minn., will erect a 75-barrel flour mill and sawmill with a capacity of 15,000 to 20,000 feet per day.

The Cottage Grove (Ore.) Manufacturing Company will increase the capacity of its planing mill. New machinery will be installed.

The Fidalgo Island Packing Company, Anacortes, Wash., will increase the capacity of its fish cannery. New equipment will be installed.

The city of Puyallup, Wash., is planning to rebuild its pumping station. New machinery will be installed and the plant made modern.

The Northern California Power Company, Red Bluff, Cal., will make extensions and improve its gas works. The capacity will be increased.

The Farmers Coöperative Creamery Company, of Tyler, Minn., let the contract to Mr. Noe, of Hanska, Minn., for a $10,000 creamery.

The city of Centerville, Wash., is planning to install a waterworks system. An electric-lighting plant is to be installed in conjunction.

The plant of the H. G. Richardson Shingle Company, Olympia, Wash., was partially destroyed by fire. Loss, $10,000. The plant will be rebuilt.

The McCully-Rumble Power Company, Wallowa, Ore., will build a new power plant on the Wallowa river in this vicinity. Plans are being prepared.

The American Lifeograph Company, Portland, Ore., has purchased property and will erect a plant for the manufacture of moving-picture films.

The Lovegren Lumber Company, Portland, Ore., will build a large sawmill at Cherry Grove, near Forest Grove, Ore. The plant will be fully equipped.

Charles R. Towle, Lordsburg, Cal., has purchased a site and is planning to build a factory for the manufacture of shoes. The plant will be fully equipped.

The Oregon Borax Company, Lakeview, Ore., will install new machinery at its borax properties on Alkali lake. Joseph Gaston is head of this company.

The Cameron Lumber Company, Limited, Spokane, Wash., has increased its capital stock from $200,000 to $500,000 and is planning to make improvements in its plant.

The Laurel Lumber Company, Pepperwood, Cal., recently organized, will establish a plant for the manufacture of veneer stock. F. W. Georgeson is head of this company.

The Oakland (Cal.) Gas, Light and Heat Company will double the capacity of its power plant. About $500,000 will be expended on new electric and steam equipment.

Power-plant equipment will be required in the new hospital to be erected by the St. Joseph's Hospital, of Tacoma, Wash. Estimated cost $450,000. Plans are being prepared.

H. D. Wade, Los Angeles, Cal., is at the head of a company which will establish a factory for the manufacture of tile and pressed brick. About $125,000 will be expended.

The Coast Range Lumber Company, Mabel, Ore., is planning to install a waterworks system to serve this vicinity; an electric-lighting plant will also be installed for this purpose.

The Pacific States Telephone and Telegraph Company, Sacramento, Cal., will build a new station in the Oak Park district. About $27,000 will be expended upon new equipment.

The plant of the Vale (Ore.) Light and Power Company, has been purchased by the Telluride Association. The company is plan-

ning to make additions and extensions in this system.

The Hope (Idaho) Lumber and Manufacturing Company will make extensive improvements and additions in its plant. New engines and boilers and other machinery will be installed.

A refrigerating plant will be installed in the new building to be erected at San Francisco, Cal., by the American Fish and Oyster Company. Headquarters of company, Black Diamond, Cal.

George Rice & Sons, Los Angeles, Cal., printers and bookbinders, have leased property and will build a new plant. The present capacity will be increased and the plant fully equipped.

Power-plant equipment will be required in the new court house to be erected at Ventura, Cal. Estimated cost $250,000. Plans are being prepared by A. C. Martin, architect, Los Angeles, Cal.

W. W. Craycroft and J. I. Wagy, Maricopa, Cal., are at the head of a company which is planning for the erection of a brick-manufacturing plant in this section. The factory will be fully equipped.

The Emery & Nelson Company, Inc., has been organized at Napavine, Wash., by W. W. Emery and Thomas Nelson, with a capital of $150,000. The company will establish a saw- and shingle-mill plant.

The Clipper Publishing Company, Bountiful, Utah, has been organized by C. R. and John Stahl. The company will establish a printing and publishing plant. Modern machinery will be installed.

Power-plant equipment will be required in the new 16-story hotel to be erected at Pittsburg, Ore., by the Wiggins Hotel Company, of New York. F. H. Wiggins will be the company's representative.

Power-plant equipment will be required in the new six-story building to be erected at Portland, Ore., by the Portland Building and Investment Company, Reid Brothers, architects, San Francisco, Cal.

M. Morgan, head of the Morgan Securities and the Mexican-American Exploration Company, Los Angeles, Cal., is planning to build a refrigerating and ice plant at Oxnard, Cal., to serve this section.

The Mechanics' Planing Mill has been incorporated at Fresno, Cal., by Henry F. Starbuck and William S. Stacey. The company will establish a planing mill. Modern machinery will be installed.

Power-plant equipment will be required in the new hospital to be erected by the Bellevue Hospital at San Francisco, Cal. The Pacific Architectural and Engineering Company, San Francisco, is preparing plans.

Power-plant equipment will be required in the new building which is planned at Seattle, Wash., by the Young Men's Christian Association. The structure will be eight stories and is estimated to cost $400,000.

The plant of the Occidental Lumber Company, Corvallis, Ore., has been purchased by the Garrow Lumber Company. The new owners will increase the capacity of the sawmill and install new machinery.

Power-plant equipment and a vacuum-cleaning plant will be installed in the new factory to be erected by the Brownstein-Louis Company, Los Angeles, Cal. George W. Harding, engineer, Los Angeles.

Power-plant equipment and a vacuum-cleaning plant will be installed in the new apartment house to be erected at Los Angeles, Cal., by F. O. Engstrum. Plans are being prepared. Estimated cost, $300,000.

The Penn Valley Creamery, Nevada City, Cal., will build an addition to its creamery and refrigerating plant. The company is also planning to build a fruit-canning plant. B. S. Rector is head of this company.

The M. A. Phelps Lumber Company, Spokane, Wash., whose new lumber mill at Cusick is nearing completion, will equip the plant with the latest sawmill machinery. A steam-power plant will also be installed.

L. E. Srack, El Centro, Cal., formerly connected with the Imperial Valley Oil and Cotton Company, is at the head of a company which will erect a cotton-gin plant at Blythe. The new plant will be fully equipped.

The Ideal Door Company, Hoquiam, Wash., has been incorporated by W. J. Elliott and E. G. McGlauflin, with a capital stock of $20,000. The company is planning to establish a plant for the manufacture of doors.

Power-plant equipment will be required in the new department store to be erected by Hale Brothers (San Francisco, Cal.), at Oakland. The site has just been purchased and plans will be prepared. About $250,000 will be expended.

George H. Savage, Spokane, Wash., has organized a company and will build a glass-manufacturing plant near Buckeye, where extensive silica property has been obtained. The Spokane Chamber of Commerce is interested in this project.

The International Box and Basket Company, Raymond, Wash., has been incorporated by B. S. Swanson and W. W. Wood, with a capital of $50,000. The company will establish a wood-working plant for the manufacture of its specialties.

The city of Palo Alto, Cal., has voted bonds for the following: New pumping plant, $2000; building for the municipal lighting plant and a steam conductor and water cooler at the waterworks, $20,000; a garbage incinerator paint, $15,000.

The Tallant Packing Company, Astoria, Ore., has purchased the fish-canning plant of the Klamath Packing and Trading Company, Requa, Cal. The company will rebuild the plant and install new machinery. The capacity will be increased.

The Beaver River Power Company, near Bliss, Idaho, has commenced the erection of its new power plant on the Malad river. The company plans an extensive plant and system and will expend about $7,000,000 before the project is completed.

J. A. Doyle, Seattle, Wash., will form an organization to be known as the Coast Clay Company, with a capital of $200,000. The company will build a plant for the manufacture of cement bricks. Mr. Doyle is connected with the Denny-Renton Clay and Coal Company, Seattle.

The Yosemite Power Company, recently incorporated at San Francisco, Cal., by John Hays Hammond and others, has acquired the water rights of the Tuolumne River Power Company, near Groveland, Cal. Over $10,000,000 is to be invested in power plants and other work in this section.

The Sacramento Sierra Power and Water Company, Sacramento, Cal., has been incorporated with a capital stock of $2,500,000. The comapny is planning to build power plants and water systems to supply Calaveras, Sacramento, Amador and other counties. Charles Chapman, San Francisco, is head of this company.

CANADA

New Westminster, B. C., will install a new water-pumping plant.

Stettler, Alberta, will install a complete new electric-lighting plant.

Peachland, B. C., will install a complete new electric-lighting system.

New Westminster, B. C., will install a new electric-lighting system.

Brigdens, Limited, will build a new $50,000 engraving factory in Toronto.

The Moose Jaw Electric Company will build a new power house there.

Fire destroyed the box factory of the Parry Sound (Ont.) Lumber Company.

The Crown Furniture Company will extend its factory at Preston, Ont.

The Imperial Oil Company will equip a $75,000 plant at Edmonton, Alberta.

The Canadian Buffalo Sled Company will build a big new factory at Preston, Ont.

North Battleford, Sask., will spend $40,000 for new waterworks pumping machinery.

The Grand Metis Power Company, of Montreal, will locate a big new plant there.

Swift Current, Sask., is in the market for complete equipment for a new telephone system.

The Albert Pressed Brick Company is building a large new factory at Calgary, Alberta.

The plant of the Central Electric Company at Portage la Prairie, Manitoba, will be enlarged.

A. H. Diver, of Trenton, Ont., will equip a large new sash and door factory at Sarnia, Ont.

J. O. Hourigan is interested in a big match factory which will be built at Port Arthur, Ont.

Vancouver, B. C., will install a complete new rock-crushing plant and will buy $50,000 worth of machinery.

The City of London will buy electrical transformers, meters, generators and other electrical equipment.

The Alberta Linseed Oil and Paint Company will locate a $200,000 factory at Medicine Hat, Alberta.

Winnipeg, Manitoba, is calling for tenders for six 500-kilowatt step-down transformers for a new substation.

B. Ward, of Saskatoon, is interested in a large binder-twine factory which will be built there and will cost $100,000.

The Canadian Western Lumber Company will equip an immence planing mill, sash and door factory and box factory at Fraser Mills, B. C.

F. L. Tennent, of Estevan, Sask., is head of a company that will locate a $150,000 factory for the manufacture of sewer pipe there.

The power house and plant of the Midland Street Railway, Light and Power Company at Penetanguishene, Ont., will be greatly enlarged.

Prince Albert, Sask., is calling for tenders for a 600-kilowatt, 2200-volt, 60-cycles, three-phase engine-type alternator, installed complete, a 100-horsepower cross-compound Corliss engine, boilers and all equipment.

MINING

Charles Crawford, Valdez, Alaska, will install a new stamp mill.

The Tightner mine, Alleghany, Cal., will install a new aërial tramway.

The Cliff mine, Valdez district, Alaska, will install a new stamp mill.

The Trinidad mine, Jalisco, Mex., is planning to install an aërial tramway.

H. L. Johnson, Alleghany, Cal., will install a new stamp mill in the near future.

The Comstock mines, Virginia City, Nev., will increase the capacity of its cyanide plant.

G. H. Utter, operating copper mines at Pinos Altos, N. M., will install a 50-ton concentrating plant.

The Idaho-Continental mine, Bonner county, Idaho, is planning to erect a 500-ton concentrating plant.

The Copper Queen Mining Company, Tucson, Ariz., will install new machinery at its Giesman properties.

The United Gold Mining and Milling Company, Tuolumne county, Cal., will increase the capacity of its stamp mill.

The Andy Fritz Gold Mining and Milling Company, Moores Flat (Nevada county), Cal., will install a new stamp mill.

The American Smelting and Refining Company will install new machinery at its Santa Francisca mines, Aguascalientes, Mex.

The Alaska Gold Quartz Mining Company, operating on Willow creek, near Knik, Alaska, will increase the capacity of its stamp mill.

The Mildred Gold Mining Company, Stanton, near Congress, Ariz., is planning to install a cyanide plant and aërial tramway.

The Texas mine, Old Diggings district, near Redding, Cal., is planning to install a cyanide plant and other machinery for operation.

T. C. Parker, Battle Mountain, Nev., is at the head of a company which will build a new cyanide plant at Cortez. Ground has been broken for this plant.

The Engels Copper Company, operating near Taylorsville, Cal., has commenced the erection of a building for a 50-ton smelting plant. An aërial tramway will also be installed.

Business Items

Cummings Machine Company has moved its office and shop to the Bush Terminal buildings, fifth floor, factory No. 6, Brooklyn, N. Y.

The Universal Vanadium Company has been formed to act in conjunction with the Vanadium Sales Company of America as selling agents for the American Vanadium Company. The following are the officers and directors: Edward M. McIlvain, president, 30 Church street, New York city; Millard Hunsiker, vice-president, 23 Rue de La Paix, Paris, France; James C. Gray, secretary and treasurer, Frick building, Pittsburg, Penn.; Joseph W. De Wyckoff, European representative, 64 Victoria street, Westminster, London, England; E. Marshall Fox, Wetley Rocks, Staffordshire, England; Sylvester D. Townsend, Jr., Wilmington, Del.; William McIlvain, Reading, Penn.

Catalogs Wanted

The Canadian Steel Foundries, Limited, Welland, Ont., intends installing more machinery in its rolling mill and steel foundry. Is starting a local purchasing department and would be glad to receive catalogs from manufacturers.

Forthcoming Meetings

National Association of Manufacturers, annual convention, May 15, 16, 17, Waldorf-Astoria hotel, New York city. Geo. S. Boudinot, secretary, 30 Church street, New York city.

National Machine Tool Builders' Association, spring meeting, May 18-19, 1911, Hotel Marlborough-Blenheim, Atlantic City. Chas. E. Hildreth, secretary, Worcester, Mass.

International Master Boiler Makers' Association, Omaha, Neb., May 23, 24, 25, 26, 1911.

American Foundrymen's Association, annual convention, Pittsburg, Penn., May 23 to 26, 1911. Richard Moldenke, secretary, Watchung, N. J.

American Society of Mechanical Engineers, spring meeting, Pittsburg, Penn., May 30 to June 2, 1911. Secretary, C. W. Rice, 29 West 39th St., New York City.

Society of Automobile Engineers, midsummer meeting, Dayton, Ohio, June 15, 16 and 17, 1911. C. F. Clarkson, secretary, 1451 Broadway, New York city.

The Institute of Operating Engineers. Regular meeting second Thursday of each month, Engineering Societies building, New York City. M. W. Rice, secretary, 29 West Thirty-ninth street, New York City.

American Society of Mechanical Engineers; monthly meeting second Tuesday. Calvin W. Rice, secretary, 29 West Thirty-ninth street, New York City.

Boston Branch National Metal Trades Association. Monthly meeting on first Wednesday of each month, Young's hotel. D. F. S. Clark, secretary, 141 Milk street, Boston, Mass.

Providence Association of Mechanical Engineers. Monthly meeting fourth Tuesday each month. E. C. Bliss, president, 91 Sabine street, Providence, R. I.

New England Foundrymen's Association; regular meeting second Wednesday of each month, Exchange Club, Boston, Mass. Fred F. Stockwell, 205 Broadway, Cambridgeport, Mass.

Engineers' Society of Western Pennsylvania; monthly meeting third Tuesday. Elmer K. Hiles, secretary, Fulton building, Pittsburg, Penn.

Superintendents' and Foremen's Club of Cleveland; monthly meeting third Saturday. Philip Frankel, secretary, 310 New England building, Cleveland, O.

Western Society of Engineers, Chicago, Ill. Regular meeting first Wednesday evening of each month, excepting July and August. Secretary, J. H. Warder, 1735 Monadnock block, Chicago, Ill.

Philadelphia Foundrymen's Association; meetings first Wednesday of each month, Manufacturers Club, Philadelphia, Penn. Howard Evans, secretary, Pier 45 North, Philadelphia, Penn.

WANTS

Rate 25 cents per line for each insertion. About six words make a line. No advertisements abbreviated. Copy should be sent to reach us not later than Friday noon for ensuing week's issue. Answers addressed to our care, 505 Pearl Street, New York, will be forwarded. Applicants may specify names to which their replies are not to be forwarded, but replies will not be returned. If not forwarded, they will be destroyed without notice. No information given by us regarding any advertiser using box number. Original letters of recommendations or other papers of value should not be inclosed to unknown correspondents. Only bona-fide advertisements inserted under this heading. No advertising accepted from any agency, association or individual charging a fee for "registration," or a commission on wages of successful applicants for situations.

Miscellaneous Wants

Caliper catalog free. E.G.Smith, Columbia, Pa.

Special machinery developed and manufactured. Tompkins Bros. Co., Troy, N. Y.

Wanted—To buy a small machine shop in New England. Box 778, Amer. Machinist.

We buy or pay royalty for good patented machine or tool. Box 282, Amer. Machinist.

Wanted—Work for screw machines and gear cutter. Box 775, American Machinist.

Light, fine machinery to order; models and electrical work specialty. E. O. Chase, Newark, N. J.

"Engineering Data." Brown & Sharpe grinding practice on May list. Box 788, American Machinist.

Light and medium weight machinery and duplicate parts built to order; tools, jigs, etc. MacCordy Mfg. Co., Amsterdam, N. Y.

Punches and dies, jigs and fixtures, light and medium weight machinery, etc., built to order. Taylor-Shantz Co., Rochester, N. Y.

Wanted—Machine and press work; tools, dies, jigs and machines built to order. The G. M. Diehl Machine Works, Wabash, Ind.

Patents. C. L. Parker, Patent Attorney, ex-examiner Patent Office, 990 G St., Washington, D. C. Write for Inventor's Handbook.

Wanted—A specialty in iron or steel to manufacture on royalty or otherwise. Address, Original Novelty Company, Muskegon, Mich.

Wanted—Work for gear cutters, hand turrets, milling machines, etc.; fine work in quantities. The Seneca Falls Mfg. Co., Seneca Falls, N. Y.

Gear cutting, spur, bevel spiral wanted; parts machinery and complete machines built. The T. C. M. Manufacturing Co., 46 Lawrence St., Newark, N. J.

Draftsmen—Get "Structural Drafting," $1; "Dimensions of Pipe, Fittings and Valves," 75 cents; "Lettering," 25 cents; three for $1.50. National Book Company, Collinwood, Ohio.

Wanted—To build special machinery, automobile parts, hardware and office specialties on contract. Villinger Manufacturing Company, Williamsport, Penn.

Light and medium weight machinery and small parts in quantities; also screw machine and punch press work, tools, jigs, dies and high grade machinery. The Elgin Tool Works, Elgin, Ill.

We can save you time and money, designing your machinery, tools, jigs and fixtures; let us develop your ideas and make your patent office drawings. Toledo Engineering Co., 544 Oakwood Ave., Toledo, Ohio.

Am seeking reliable concern to manufacture my feed-water filter on royalty; well equipped machine shop and foundry will find this a profitable specialty in growing demand. Address "Steam Specialty," Amer. Machinist.

Large English firm of machine tool importers having showrooms and offices in Great Britain, France, Germany, Italy, India and Japan is wanting good agencies for machine tools of all kinds. Box 189, Amer. Mach.

For lease, new two story machine shop, 60x150, fully equipped; now running, located in southwestern part of Indiana with switch facilities; or will combine with party having good light mechanical line. Box 838, Am. M.

Wanted—Patentee of mechanic's fine tool covering wide field of usefulness, desires communication with parties equipped to manufacture some; preferably vicinity Philadelphia or New York. Address, "Tools," 2068 Esplanade avenue, Montreal, Canada.

Welding by oxy-acetylene process; special attention given to repairs of machinery and castings of all kinds; large experience in difficult experimental work; structural shapes welded together; write for particulars. Krajewski-Pesant Co., 54 Beard St., Brooklyn, N. Y.

Manufacturer of telegraph machines, adding machines, taxameters, accurate interchangeable parts, dies and special tools, invites orders for similar special manufacturing. The Universal Telegraphic Company, Successors to the Rowland Telegraphic Company, Baltimore, Md.

Proposals for ordnance supplies. Watervliet Arsenal, Watervliet, N. Y., April 15, 1911. Sealed proposals, in triplicate, will be received until 1 p.m., May 15, 1911, for furnishing steel, hardware, forage, fuel, oils, etc., during year ending June 30, 1912; information furnished on application. Lieut-Col. W. W. Gibson, Commanding.

Wanted—Machine work; a thoroughly well equipped machine tool shop, having accumulated considerable of its own product, and desiring to employ its full organization, is open for work of good class, and solicits contracts from $500 to $50,000; location, Central West. Box 765, American Machinist.

Help Wanted

Classification indicates present address of advertiser, nothing else.

ILLINOIS

Draftsmen for our engineering department, technical men of proven ability, those with experience in the design of special equipment for manufacturing plants preferred; opportunities for advancement; in reply state exact experience and qualifications. Address "Chief Engineer," Deere & Co., Moline, Ill.

Exceptional opportunity for a young, agressive and thoroughly competent tool maker and hardener of good address, familiar with use of high speed steels, as a tool steel salesman; if anxious to rise above shop limitations, give age, education, shop experience, salary expected and references in first letter. If you are not a live wire don't answer. R. D. Van Valkenburgh, 213 West Lake St., Chicago, Ill.

MICHIGAN

Wanted—High-grade detail draftsmen and tracers, experienced on automobile work; must be neat and accurate; state age, education and salary expected. Address John Springer, chief draftsman, Brush Runabout Company, Detroit, Mich.

NEW JERSEY

Tool designer wanted for electrical manufacturing concern, near New York city; state age and salary expected, past experience and technical education. Box 837, AM. MACH.

Wanted—General inspector for shop in metropolitan district, whose products consist of light structural steel, sheet iron and machine work. Good opening for man now employed; state experience, present position and age. Box 812, AMERICAN MACHINIST.

Wanted—Young man as inspector or foreman in sheet-iron and light structural shop in the metropolitan district; must be thoroughly competent to handle both classes of work; good opportunity for man now employed; give experience, present position and age. Box 811, AMERICAN MACHINIST.

NEW YORK

Wanted—First-class machinist as inspector for engine work; state last place employed, age and wages. Box 825, AMER. MACH.

Wanted—Experienced operators for Gridley, Acme and Cleveland automatics; state experience and wages. King Sewing Machine Company, Buffalo, N. Y.

Wanted—A first class designer for special printing machinery; only those who can furnish the best of references need apply. Box 566, AMERICAN MACHINIST.

Wanted—First class operator for horizontal floor boring machine; good opportunity and permanent position for competent man looking for advancement. Box 841, AM. MACH.

Assistant foreman and two gang bosses wanted in the punch press department of a large manufactory; write, stating age, experience and wages expected. Box 830, AM. MA.

Wanted—Machine-tool salesman with practical experience; unusual opportunity with rapidly growing business; state experience, age, references and salary expected. Box 823, AMERICAN MACHINIST

Steamfitter wanted to take charge of steam, water and gas piping in large factory; must also have experience as plumber and be used to handle men to the best advantage; reply in writing to Box 824, AMER. MACH.

Experienced man for milling department to take charge of from 75 to 100 men in machine shop doing general work; state age, experience, nationality and where formerly employed. Address "Cincinnati," Box 840, AM. M.

Foreman (night shift) for company using automatic wire forming and working machines; one who has had experience in handling help, also some machinist knowledge; steady employment and good wages. Box 796, AMERICAN MACHINIST.

Oxyacetylene operator wanted; high-grade man to take charge of large installation; state age, experience (both in oxyacetylene work and in former occupation), references and salary; replies will be considered strictly confidential. Box 828, AMER. MACH.

A large, well established company, making special patent machinery with offices and factories in different countries, has a vacancy for a capable, energetic uptodate business man of unimpeachable integrity, to take charge of their main American office located in New York; must be able to invest at once $75,000 in the company's preferred stock paying quarterly dividends at the rate of 7 per cent. per annum; salary to commence, $3500 per annum, to be advanced to six thousand in the course of time; full investigation and references required and given. Box 802, AMERICAN MACHINIST.

Mechanical or electrical engineer wanted by a large machinery manufacturing concern doing an international business, to take the position of treasurer and office manager of the company's home office in New York; salary three thousand per annum to commence, to be advanced to five or six thousand per annum; must be a capable man for his position, and be prepared to immediately invest fifty thousand dollars in the company's preferred stock paying 7 per cent. annual dividends quarterly; first class references given and expected. Box 803, AMER. MACHINIST.

OHIO

Wanted—Draftsman, experienced on large machine tools, no other need apply. Box 831, AMERICAN MACHINIST.

Wanted—Draftsman with experience on electric traveling cranes; steady employment and good wages to competent man. Address Toledo Bridge & Crane Co., Toledo, O.

Wanted—First class machinists, toolmakers, die sinkers, lathe, planer, drill press, screw machine, boring and milling machine operators, wood and metal patternmakers, brass polishers, buffers, finishers, millwrights, hammermen and blacksmiths, who wish to increase their opportunities, to register with the free Employment Department of the National Metal Trades Association, New England Building, Cleveland, Ohio.

PENNSYLVANIA

Wanted—Draftsman on installation of refrigerating machinery; state age, experience and expected salary. Box 820, AMER. MACH.

Wanted—Instructors in mechanical and electrical engineering and mechanical drawing in an eastern institution; graduates from technical schools, preferably with one or two years' practical experience. Address with references, Box 829, AMER. MACHINIST.

The Monotype School is maintained to train young men to meet the constant demand for operators of our type casting and composing machine; these operators do so well that we receive more applications for places than can be filled; these qualifications carry most weight: Common sense, automatic machinery experience, printing office experience, type foundry experience. Full particulars will be furnished to inquirers who furnish the same information about themselves, and mention this paper. Lanston Monotype Machine Co., Philadelphia.

RHODE ISLAND

Wanted—One foreman planner at $5.20 per diem; a competitive examination will be held May 22, 1911, for the purpose of filling the above position. For further information address "Inspector of Ordnance in Charge, Naval Torpedo Station, Newport, R. I."

Wanted—Fifty tool designers; experienced competent men in the design of jigs, fixtures, punches and dies and other special tools used in the manufacture of high grade machine parts on an interchangeable basis; apply by letter stating age, experience and salary required, as well as the date when you would be able to start if application was accepted. The Taft-Peirce Manufacturing Company, Woonsocket, R. I.

WISCONSIN

Wanted—By a firm manufacturing saw mill machinery, an experienced toolmaker with common sense ideas and good habits; married man about 35 years of age preferred. Box 783, AMERICAN MACHINIST.

Wanted at Once—Expert tool designer and machine shop foreman; thorough mechanic having experience with good machine shop practice and production; state actual experience, age, references and salary expected. Box 764, AMERICAN MACHINIST.

Wanted—Draftsman to work on truck and one to work on pleasure cars; one competent to carry on design under engineer's supervision; state experience and salary expected and give references in first letter. Box 819, AMERICAN MACHINIST.

SITUATIONS WANTED

Classification indicates present address of advertiser, nothing else.

CONNECTICUT

A-1 tool designer and mechanical draftsman; seven years' varied experience; practical man; New England States preferred. Box 839, AMERICAN MACHINIST.

Situation wanted as machine shop foreman with 25 years' experience, both light and heavy work; can furnish references. Address "G. A. H.," AMERICAN MACHINIST.

Situation wanted as superintendent or factory manager; thoroughly conversant in foundry and machine shop, both light and heavy work; have had 20 years' experience; references. Box 833, AMER. MACHINIST.

INDIANA

Experienced draftsman, mostly on machine tools, desires change. Box 821, AMER. MACH.

Graduate mechanical engineer; age 31; medium and heavy machinery experience; first-class designer; can take charge of work and produce results; at present employed. Box 822, AMERICAN MACHINIST.

MASSACHUSETTS

Mechanical inspector, holding responsible position with large concern, wishes to change location. Box 777, AMERICAN MACHINIST.

Mechanical superintendent accustomed to medium and small interchangeable work requiring accuracy, thoroughly competent, good executive, sober, reliable, desires change. Box 799, AMERICAN MACHINIST.

Mechanical engineer with 20 years' experience wants position as chief draftsman or machine designer; 12 years' experience as chief draftsman on special machinery, printing presses and paper-handling machinery; best of references. Box 798, AMER. MACH.

Superintendent desires change; American, 40; 15 years' experience on fine work, in charge of manufacturing, tool work and as superintendent; thoroughly familiar with modern methods; successful in handling help; references A-1; satisfactory reason for change. Box 835, AMERICAN MACHINIST.

MICHIGAN

Mechanical engineer, experienced on gas engines, gas producers and other machines, is open for engagement; competent to organize engineering department; thorough, accurate, reliable. Address "Engineer," AM. MA.

NEW JERSEY

Mechanical draftsman desires position; technical graduate; 10 years' varied experience. Box 792, AMERICAN MACHINIST.

Superintendent or assistant superintendent; 20 years' practical experience on general machine and tool work; uptodate in organization and cost systems; best of references. Box 834, AMERICAN MACHINIST.

A toolmaker, at present in charge of a manufacturing department, wants to change to a place where he will be given an opportunity to invent labor saving devices or special machinery and superintend the making of same. Box 836, AMERICAN MACHINIST.

NEW YORK

A-1 mechanical draftsman, ten years' varied experience, A-1 references, desires to locate in Manhattan or immediate vicinity in New Jersey. Box 843, AMERICAN MACHINIST.

Toolmaker or machinist; young man well trained to close work on tools and jigs; can work on bench and all tools; three years' experience as all-around man. Box 827, AMERICAN MACHINIST.

Manager or superintendent, capable of taking entire charge of a manufacturing plant, desires to make a change; experience with and references from three of the largest, best known plants in America. Box 754, AMERICAN MACHINIST.

Graduate mechanical engineer, nine years' general experience, five years with air compressor builders, design, testing, development of electric driven units, special problems in air and natural gas compression, sales engineering and publicity work, wants responsible position with compressor builders; at present employed. Box 770, AMER. MACH.

OHIO

Secretary or correspondent—Young man of 27, ten years' all-around experience, desires responsible position with growing concern; five years in machine-tool business; expert stenographer. Box 826, AMER. MACH.

Position as office manager; can handle any branch of office work from accounting to shop production; ten years' experience in manufacturing business; five years in executive capacity; strong on organization and modern methods of obtaining costs; best of references. Address Box 832, AM. MACH.

PENNSYLVANIA

General foreman, designer, expert on tools and dies, desires change; good technical education; 12 years of experience in adding machine, typewriter, gun and electric work; modern executive; a German who has been through the mill and can guarantee results. Box 804, AMERICAN MACHINIST.

Superintendent or assistant superintendent; age 39; have had 25 years' shop experience, 20 years' designing tools and special machinery, last ten years in charge of drawing rooms of from 10 to 35 draftsmen; good on system and a producer; original in designing and fully posted on uptodate manufacturing methods along typewriter, adding machine and gun lines. Box 800, AMER. MACH.

FOR SALE

For Sale—Drawings, patterns, patent, tools, etc., of a brand new line of the very best machine tools of the kind on the market. Box 842, AMERICAN MACHINIST.

Old established plant manufacturing high grade line of equipment, for sale; in operation thirty-seven years; now running; price right. Wm. H. H., 1818 Holland St., Erie, Penn.

For Sale—Complete lathe outfit, known as the "Gem," which includes drawings, gigs, templets, tools, and includes partially finished lathes and parts, 14-inch swing, with 6, 8 and 10-foot beds. Stiles Manufacturing Company, Parkersburg, W. Va.

For Sale—One story and basement brick machine shop, forty by one hundred feet, fully equipped for light work, now running, located in growing town within fifty miles of Philadelphia, on two trunk lines; or will combine with party having good light mechanical line; references exchanged; no agents or triflers. Box 747, AMERICAN MACHINIST.

For Sale—A modern constructed machine shop and foundry, located in the Central West's manufacturing district; unsurpassed railroad facilities; 75,000 square feet floor space, modern equipment, foundry fully equipped for light and medium heavy work and has an established trade; will consider consolidation with any established business that requires a foundry and machine shop for the manufacture of its product. Box 810, AMERICAN MACHINIST.

Talks With Our Readers

By The Sales Manager

$98 for a single inch one time, $7000 for one insertion of an ad on the back cover—

When shrewd business men—experienced general advertisers—buy space at these rates, it's interesting to know the platform on which such a publication, The Ladies' Home Journal, is built.

The Curtis Publishing Company has just issued a booklet, "The Curtis Advertising Code," from which we extract:

At the very outset it should be said that our prime consideration in ruling on copy is the protection and welfare of our readers. This is the keynote of Curtis policy. Along with this is the purpose to properly protect our advertising clients, discouraging unfair, and even unmannerly, competition in our advertising columns, and safe-guarding our own publications against any advertising campaigns that would tend to injure our advertising columns in their general efficiency and standing.

Our motives in discriminating may be designated as ethical (where a moral issue is at stake), fair where the interests of our clients are at variance, and expedient where the interests of our own publications are paramount. In actual practice these various motives are often mingled and inseparable.

Neither in *The Ladies' Home Journal* nor *The Saturday Evening Post* are advertisements admissible the object of which is to deceive, defraud or in any way injure our readers.

Extravagantly worded advertisements are not acceptable, nor those in which extreme and exceptional cases are made to appear average and representative.

"Knocking" copy is not acceptable—that is to say, copy which hammers at the inferiority of competitors' goods, in contrast with the superiority of the advertiser's own.

Medical or curative copy of any kind whatever is not acceptable for either publication.

Advertisements for alcoholic liquors are not acceptable for either publication.

We do not accept the advertising of mail-order houses doing a general merchandising business. We do, however, accept the business of mail-order advertisers with a limited and specialized scope, and of merchants who do a mail-order business incidentally.

Advertising is not acceptable in which installment-plan selling is made the chief feature of the advertising, or the main selling argument. We recognize, however, the propriety of advertising in which installment payments are merely a detail of terms.

No advertising of an immoral or suggestive nature is allowed, and representations of the human form are not acceptable in any suggestive negligee or attitude. Advertisers of corsets, hosiery, underwear, etc., should consult our representatives before going to much expense in the preparation of copy and cuts for use in our publications.

It is desired to maintain in our advertising columns somewhat the same tone and atmosphere that prevail in the editorial sections. Copy that is unduly cheap or vulgar and advertisements that are too unpleasant, either in subject or treatment, are liable to rejection.

"Blind" advertising is not acceptable—that is to say, advertising which in purpose and intent is obscure or misleading.

The word "free" must not be used unless the article is actually free. A thing is not free if the reader is obliged to perform some service or buy some other article in order to secure it.

Advertisements exploiting prize competitions must in all cases be submitted to us for our approval, previous to insertion.

The U.S. Treasury Department prohibits the use of cuts of United States coins and paper money.

Advertisers must not use illustrations copyright to which resides elsewhere, unless proper permission has been obtained.

Advertisers must not use our name as a reference to their responsibility.

Advertisers must not use the name of *The Saturday Evening Post* or of *The Ladies' Home Journal* in their advertisements in a way to imply that we are interested in, or endorse their propositions

The AMERICAN MACHINIST is in the engineering field what the Curtis publications are in the general field, the prime consideration of both being the protection and welfare of the readers.

Only we go further than they in one respect—

We will not permit advertising of any kind that's not directly in our line—no matter how responsible the advertiser.

Users of our Selling Section are therefore not only protected as far as possible from fraud, but from the annoyance and distraction of advertising that's "butting in."

* * *

Only reliable products can be continuously advertised.